New Labour, New Environment? An Analysis of the Labour Government's Policy on Climate Change and Biodiversity Loss

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List of Experts Interviewed for this Report

Tom Burke	Environmental Policy Advisor to Rio Tinto plc. Previously Special Advisor to three Secretaries of State for the Environment; member of Council of English Nature ; held several official environmental advisory positions.
Tony Burton	Director of Policy and Strategy at the National Trust.
Sara Eppel	Director of Policy, Sustainable Development Commission.
John Gummer	MP, Secretary of State for the Environment (1993-97).
Stephen Hale	Director of the Green Alliance. Previously worked in DEFRA as advisor to Michael Meacher (2002-03) and Special Advisor to Margaret Beckett (2003-06).
Martin Harper	Head of Sustainable Development at the RSPB.
John Houghton	Former Director-General of the Meteorological Office; Chairman or Co-Chairman of the Scientific Assessment Working Group of the IPCC (1988-2002); Chairman of the Royal Commission on Environmental Pollution (1992-98).
Michael Jacobs	Economic Advisor at the Treasury. Previously General Secretary of the Fabian Society.
Stephen Joseph	Executive Director, Transport 2000.
Tony Juniper	Executive Director, Friends of the Earth
John Lawton	Chairman of the Royal Commission on Environmental Pollution (since 2005). A leading academic who was previously Chief Executive of the Natural Environment Research Council.
Peter Madden	Chief Executive, Forum for the Future. Previously Head of Policy at the Environment Agency; Ministerial Adviser at DETR and DEFRA; Director of Green Alliance.
Michael Meacher	MP, Minister of State for the Environment (1997-2003).
Jonathon Porritt	Chairman of the Sustainable Development Commission (since 2000), Founder Director of Forum for the Future, Co-Director of the Prince of Wales's Business and Environment Programme, and leading writer and broadcaster on environmental issues.

Guy Thompson	Executive Director for External Affairs at Natural England. Previously Director of the Green Alliance; Head of Government Affairs and Parliamentary Officer at the RSPB.
Rebecca Willis	Independent researcher and Vice-Chair of Sustainable Development Commission. Previously Director of the Green Alliance.

Glossary

APD	Air Passenger Duty
BAP	Biodiversity Action Plan
BSE	Bovine Spongiform Encephalopathy
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CBI	Confederation of British Industry
CCA	Climate Change Agreements
CCGT	Combined Cycle Gas Turbine
CCL	Climate Change Levy
CCP 2000	Climate Change Programme 2000
CCP 2006	Climate Change Programme 2006
CCS	Carbon Capture and Storage
CERT	Carbon Emission Reduction Target
CFC	chlorofluorocarbon
CFP	Common Fisheries Policy
CHP	Combined Heat and Power
CITES	Convention on International Trade in Endangered Species
CO_2	Carbon Dioxide
CONABIO	National Commission for the Knowledge and Use of Biodiversity
CPRE	Campaign to Protect Rural England
CROW	Countryside and Rights of Way Act, 2000
DCLG	Department for Communities and Local Government
DEFRA	Department for the Environment, Food and Rural Affairs
DETR	Department for Environment, Transport and the Regions (1997-2001)
DfID	Department for International Development
DfT	Department for Transport
DTI	Department for Trade and Industry
EAC	Environmental Audit Committee
ECA	Enhanced Capital Allowance
EEC	Energy Efficiency Commitment
EFRAC	Environment, Food and Rural Affairs Committee
EPI	Environmental Policy Integration
EU	European Union
EU ETS	European Union Emissions Trading Scheme
FCO	Foreign and Commonwealth Office
GHG	Greenhouse Gas
GM(O)	Genetically Modified (Organism)
GtC	Giga-tonnes of Carbon
IPCC	Inter-governmental Panel on Climate Change
MA	Millennium Ecosystem Assessment
MAFF	Ministry of Agriculture, Fisheries and Food (until 2001)
MARPOL	International Convention for the Prevention of Pollution from Ships
MBI	Market Based Instruments
MCZ	Marine Conservation Zone

MEA	Multilateral Environmental Agreement
NERC	Natural Environment and Rural Communities Act, 2006
NFFO	Non-Fossil Fuels Obligation
NFU	National Farmers' Union
NGO	Non-Governmental Organisation
NSIDC	National Snow and Ice Data Center
ODPM	Office of the Deputy Prime Minister (to 2006)
OECD	Organisation for Economic Co-operation and Development
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PPM	Parts per million
PSA	Public Service Agreement
PIU	Performance and Innovation Unit
RAMSAR	Convention on Wetlands
RCEP	Royal Commission for Environmental Pollution
ROC	Renewables Obligation Certificates
RSPB	Royal Society for the Protection of Birds
RTFO	Renewable Transport Fuel Obligation
SDC	Sustainable Development Commission
SDU	Sustainable Development Unit
SF_6	Sulphur hexafluoride
SME	Small and Medium sized Enterprises
SRES	Special Report on Emissions Scenarios
SSSI	Site of Special Scientific Interest
VED	Vehicle Excise Duty
UK BAP	UK Biodiversity Action Plan
UK ETS	UK Emissions Trading Scheme
UKOT	UK Overseas Territories
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WSSD	World Summit on Sustainable Development
WTO	World Trade Organisation
WWF	World Wide Fund for Nature

Executive Summary

This report was commissioned by Friends of the Earth and written by independent researchers from the Centre for Ecology, Law and Policy (CELP) at the University of York and the Sussex Energy Group at the University of Sussex. It reviews the most up-to-date science on climate change and biodiversity loss and assesses the Labour Government's performance in tackling these issues since it came to power in 1997. This serves to highlight the actions that Labour, under the new leadership of Gordon Brown, still needs to take in order to avoid the catastrophic future impacts of climate change and biodiversity loss.

Key Messages

1. Climate change and biodiversity loss have dire implications for the future welfare and existence of humanity. Overwhelming scientific evidence exists to support the need for urgent policy action to tackle these issues. The Labour Government has, since 1997, taken some action that begins to address climate change and biodiversity loss, but not nearly enough to address the extent of the problem as indicated by the scientific evidence.
2. Politics plays an integral role in enabling or constraining action on the environment. After nine years when there was very little pressure on the Government to be greener, the recent increase in the salience of environmental issues in party politics and public debate has led directly to a flurry of new policies. The challenge now is for all those concerned about the environment to keep environmental politics high on the political agenda and to sustain the current public enthusiasm for environmental issues.
3. There is an urgent need for joined up environmental governance to address the issues of climate change and biodiversity loss that cut across traditional policy sectors, such as energy, transport, housing and farming. Individual ministries still typically engage in a blinkered pursuit of narrow policy sector objectives with little consideration for their environmental impact. The Government must facilitate the integration of environmental concerns across every Department and policy sector.
4. These challenges require visible, committed and sustained political leadership to drive environmental considerations across government. Tony Blair provided unprecedented leadership on the international stage but his domestic impact was limited. Gordon Brown must expend some precious political capital in providing the domestic leadership Blair failed to deliver. However, Brown's early actions do not yet signal that he is serious about the environment.
5. The formation of a new Labour Government under Gordon Brown opens further the exciting window of opportunity to make a step change in environmental policy. If the Prime Minister is committed to Cabinet Government, then the environment offers the perfect opportunity for Brown and his new Government to demonstrate a new style of collective leadership, in which old style Departmentalism is replaced by a progressive, genuinely joined-up strategic approach to resolving the twin challenges of climate change and biodiversity loss.

The Science of Biodiversity Loss and Climate Change

Climate change and biodiversity loss have dire implications for the future welfare and existence of humanity.

There is now overwhelming scientific evidence demonstrating that climate change is happening and that, without urgent action, it poses a catastrophic threat to our future economic welfare and, ultimately, our lives. As a result of human emissions of CO_2 and other greenhouse gases, global average temperatures have increased, patterns of precipitation are changing, snow and ice cover is receding and sea levels are rising. Unless human greenhouse gas emissions are radically reduced, the impacts of climate change will become increasingly more extreme. Sea levels will continue to rise, extreme weather events such as flooding and droughts will become more frequent and widespread, and others, such as tropical storms, will become more intense. Dangerous 'tipping points' are also likely to be reached where events such as the melting of vast areas of permafrost exposing peat soils, or extensive increases in microbial soil activity, will result in further rapid releases of greenhouse gases into the atmosphere thus speeding the process of climate change. Another possible extreme tipping point is the slowing or even switching off of the 'Gulf Stream' or 'North Atlantic drift'. This would have extreme impacts on large parts of northern Europe, including the UK, by significantly reducing minimum winter temperatures.

Many political figures, including Prime Minister Gordon Brown, have made statements that highlight the severity of the problem of climate change and the need for urgent policy action. Current Government policy, however, aims to stabilise atmospheric concentrations of CO_2 at 550ppm, with the aim of limiting the global average temperature increase to 2^oC – anything above that level is internationally recognised as likely to result in dangerous climate change. However, many commentators, including Government departments, have long highlighted the need to aim for much lower concentrations. The most up to date and comprehensive review of the scientific evidence by the IPCC suggests that stabilising concentrations anywhere above 350ppm CO_2 is likely to result in an increase in global average temperature of more than 2^oC. Moreover, for this 350ppm CO_2 concentration to hold the temperature increase to 2^oC the IPCC suggests that global greenhouse gas emissions must peak sometime between 2000 and 2015, implying a maximum of just over seven years still available to begin to reduce global emissions.

Human activity is also having a profound and often irreversible impact on biodiversity. Biodiversity can be simply defined as the diversity of life on earth. Biodiversity is vital to the functioning of ecosystems upon which humans rely for essential goods and services that support our economies, process our waste and maintain the climate in such a way as to make human existence on earth possible. Biodiversity loss tends to receive less attention from politicians than does climate change, yet it poses a similarly severe threat to human well-being. Furthermore, in the future climate change is likely to hasten the current unprecedented levels of biodiversity loss.

Current rates of species extinction are reported to be one thousand times higher than anything that the fossil record shows has ever occurred before. This is mostly a direct

result of human activities, most notably habitat change (e.g. conversion of forested land to agriculture, urbanisation, modification of and water extraction from rivers, destruction of coral reefs, damage to sea floors due to trawling, desertification), climate change, invasive alien species, overexploitation of species (e.g. over-fishing) and pollution (in particular nitrates, phosphorus and sulphur from agriculture and industrial processes).

Without urgent policy action to address the direct and indirect causes of biodiversity loss we risk irreversibly damaging the ecosystem functions upon which we rely to make economic activity and, ultimately, human existence on earth possible.

UK Climate Change Policy since 1997

The Labour Government has, since 1997, taken some action that begins to address climate change, but not nearly enough to tackle the extent of the problem as indicated by the science. The UK Government, notably Tony Blair, has played a leading role in advancing the climate change agenda on the international stage, but this has not been matched by a similar ambition at the domestic level. Most notably, the Government's target to stabilise greenhouse gas concentrations at 550ppm CO_2 is much higher than the 350ppm CO_2 that the science now suggests is necessary to avoid dangerous climate change.

Energy Sector

Provisional figures indicate that carbon emissions rose 1.25% in 2006 to reach their highest level since Labour came to power – some 2.7% higher than in 1997 and 3.7% higher than their lowest level in 1999. The UK should meet its Kyoto target of reducing greenhouse gas emissions by at least 12.5% below baseline 1990 emissions levels over the period 2008-2012. This achievement is largely the fortuitous result of the switch from coal to gas for power generation during the early 1990s rather than a deliberate Government emissions reduction policy. The UK will fail to meet its tougher domestic goal of reducing CO_2 emissions by 20% below base levels by 2010.

Despite introducing the Renewable Obligation, the Government has failed to do enough to stimulate significant growth in the renewables sector and looks set to miss its target of 10% of electricity to be generated from renewables by 2010. The Government has made a U-turn on its policy towards nuclear power since its 2003 Energy White Paper, with Tony Blair publicly expressing the Government's intention to support the construction of new nuclear power stations (despite failing to carry out a legitimate public consultation on this hugely controversial issue). In order to be successful in the long term, the Government's approach to energy policy needs to consider the institutional and infrastructural systems that determine the way energy is generated, supplied and used. Without a more holistic approach to understanding the nature of energy policy, a successful transition to a low carbon economy is highly unlikely to be achieved.

Business Sector

There are very few measures to reduce GHG emissions in the business sector. Some progress has been made in reducing emissions via the Climate Change Levy and Climate Change Agreements, but most of the emissions reductions were the result of the initial

'announcement effect'. The EU ETS will have little if any impact on Greenhouse Gas Emissions from the business sector before 2012.

Domestic Sector

The domestic sector offers opportunities for a range of easily achievable measures to reduce emissions. To date, however, the government has largely failed to take advantage of these opportunities. Policy consists of a modest set of measures that fall well short of what is necessary to deliver serious emission reductions. The Government has repeatedly failed to meet its own targets for reductions in this sector.

Transport Sector

In the transport sector, carbon dioxide emissions are rising faster than from any other sector and are likely to become the largest source of UK emissions in the near future. The Labour Government started out with great aspirations for reforming transport policy, but perhaps in no other policy area have its efforts fallen so short. Its reluctance to make concerted efforts to reduce the amount that people drive or fly implies little hope for future reductions from this sector. The fuel protests in 2000 profoundly shocked the Government, so although the Treasury has introduced some innovative tax measures, it has subsequently been extremely nervous about anything that might be construed as increasing the cost of motoring. The Government's 'predict and provide' approach to aviation and the lack of any substantive carbon reduction measures represents a serious policy failure.

Biodiversity Policy Since 1997

Biodiversity has always been lower on the Blair Government's agenda than climate change, despite the similarly catastrophic implications of biodiversity loss.

Domestic Action

Action on biodiversity loss in the UK has been successful at slowing or reversing the decline in some species and habitats but many are either not improving or are still in decline. There is a significant shortfall in funding available for delivering the UK Biodiversity Action Plan.

The Government has made positive advances in improving the impact of agriculture on biodiversity, although the funding available to support agri-environmental schemes remains limited. Policy to address biodiversity loss in the marine environment is inadequate; these weaknesses are only partially addressed by the much delayed Marine Bill. The Planning White Paper and current house-building plans represent a real threat to biodiversity and other key sectors such as transport, energy and industry give biodiversity loss little attention. If the Government is to achieve its declared aims of halting and reversing biodiversity loss it needs to ensure biodiversity is integrated across the whole spectrum of UK policy. It is also notable that the Government is heavily dependent on the remarkable voluntary work of many conservation NGOs for the development and delivery of biodiversity policy.

International Action and Trade

The record of the Government on international biodiversity and trade issues is less impressive than its domestic record. The Government seems almost indifferent to protecting the rich biodiversity in the UK Overseas Territories. Until recently, DfID has largely ignored biodiversity considerations in its development work, despite the clear links between poverty and environmental degradation. Although it has done some good diplomatic work in the past, the FCO has recently sidelined biodiversity in favour of climate change. The UK Government has pursued a trade liberalisation agenda, particularly in the Doha Round, that has displayed little concern for the biodiversity and climate change implications of free trade.

Environmental Policy: Challenges and Obstacles

The Labour Government has never denied the science of climate change. The Prime Minister and key environment ministers have made statements that imply that they have grasped the urgency of the situation, but this urgency is not shared across the Government in key economic Departments, particularly DfT, DTI (now the Department for Business, Enterprise and Regulatory Reform) and the Treasury. The Government also seems to understand the basic need to conserve biodiversity by protecting precious habitats and species, but the fundamental messages of the Millennium Ecosystem Assessment about the fragility and importance of ecosystem functioning are only slowly trickling down into DEFRA, DfID and the Treasury.

Party Politics

Until the last year, the environment has remained a low profile issue in party politics. The Labour and the Conservative parties have paid minimal attention to the environment in their party manifestos, whereas the Liberal Democrats have consistently made it a central campaigning issue. Political parties generally tend to pay more attention to the environment in the mid-term of a parliament, but shy away from it around general elections. There has, however, recently been a clear ‘Cameron effect’ on environmental politics. The attention given to the issue by David Cameron has helped move the environment up the political agenda and encouraged policy responses by Government. It remains to be seen whether this will be sustained under the Brown premiership and whether the issue will remain on the party political agenda approaching the next general election.

The Labour Party and Environmentalism

Action on the environment can conflict with traditional Labour emphases on economic growth and job creation. It also implies lifestyle compromises that are perceived as unattractive to target, ‘middle England’ Labour voters. Progressive environmental policies also often involve regulation or taxation, which challenge ‘New Labour’s’ efforts to be more business friendly. There has been little pressure on the Government from the wider Labour Party – ‘New’ or ‘Old’, in Parliament or beyond - to take a tougher stance on the environment.

More generally, the environment is traditionally viewed to be ‘bad politics’. It often involves unpopular measures now, the benefits of which will only be felt by future

generations. This has been reflected in Labour's reluctance to adopt tougher policies to protect the environment, particularly in the transport and energy sectors. Despite the interest Blair took in climate change, his enthusiasm did not progress to engagement with broader environmental issues and failed to result in sufficient policy action at the domestic level.

The Green Lobby

Most of the 'green lobby' welcomed the election of the Labour Government in 1997 and was initially a little uncritical of its efforts, but that benevolent attitude soon dissipated. Although the green lobby has exercised some modest influence over environmental legislation, it has failed (despite clear encouragement from the Government) to mobilise the kind of mass support for environmental issues that would put irresistible pressure on the Government to introduce more stringent environmental measures. Indeed, the Government has often privately expressed its frustration with the more oppositional elements of the green lobby for failing to support publicly some of its braver actions on environmental issues, such as the introduction of the Climate Change Levy.

Business Interests

Business interests have succeeded in preventing or delaying Government action on numerous environmental problems and have managed to dilute many proposals that would have imposed significant costs on business interests. Most notably, the CBI has exercised an important, mostly negative, influence over Labour environmental policy.

However, not all business interests adopt anti-environmental positions and there has been something of a sea-change at the very centre of the mainstream corporate world as epitomised by the Corporate Leaders on Climate Change. With the environmental leaders in each sector already coming onside, there is currently an unprecedented 'window of opportunity' to win the support of mainstream businesses for more progressive environmental measures.

Policy Integration

The government has failed to integrate properly action on the environment across different policy areas - individual ministries still typically engage in a blinkered pursuit of narrow sectoral objectives with little consideration for their environmental impact. The creation of the Department of Environment, Transport and the Regions (DETR) in 1997 was a bold move that could have overcome this issue but that encountered some teething problems. The subsequent dismantling of the DETR has separated the environment from both planning, which makes little sense, and transport, which effectively sidelines environmental considerations from this key sector. The failure of Brown to take advantage of the opportunity to rectify the lack of integration in the June 2007 cabinet reshuffle suggests the environment may not be a priority for the new Prime Minister.

Although the sustainable development strategy has introduced what on paper looks an impressive set of administrative structures and mechanisms aimed at enhancing environmental policy integration, in practice its impact has been limited. Policy integration was further impeded by Tony Blair's style of government, with its focus on

bilateral discussions with chief ministers and a downgrading of Cabinet discussion. This approach limited the degree of inter-departmental discussion so that individual Departments often lacked the information – let alone the inclination – to consider the environmental impact of their policies in other policy sectors. In this respect, it is possible that the new Prime Minister's declared commitment to 'Cabinet Government' could improve the coordination of environmental policy across different policy sectors.

Political Leadership

The design and delivery of effective policies to address cross-cutting problems such as climate change and biodiversity loss requires visible, committed and sustained political leadership to drive these strategies across government. The Labour Government has not provided that leadership for domestic environmental policy. One consequence is that individual departments such as transport still marginalise environmental concerns. Another is that potentially unpopular policies such as fuel duty increases, road pricing and aviation taxes have been avoided.

Two people in Government could have provided the necessary domestic strategic leadership: Tony Blair or Gordon Brown, yet it was not forthcoming. To drive any policy through the political process and the governmental bureaucracy requires considerable political capital, but Blair and Brown both chose to give priority to other issues or had more urgent demands on this precious commodity. It took the appointment of David Miliband as Secretary of State for the Environment to provide some real domestic leadership on the issue. His arrival coincided with a general rise in the profile of climate change and the impact of the 'Cameron effect' on domestic environmental politics. Miliband exercised some influence across Government, securing legislative time for the Climate Change Bill and support for several other initiatives.

As Chancellor Gordon Brown had the structural power and political influence to have driven the environmental agenda across Government but, like Blair, his priorities lay elsewhere. The Stern Report helped Brown to understand the economic significance of the issue and the important linkages between the development and environmental agendas, but the main message he seems to have drawn from it is the importance of international action - despite Stern making clear the need for domestic action too. Brown is likely to pick up where Blair left off in terms of the UK playing a leading role in international climate change diplomacy, especially with the recent appointment of David Miliband as Foreign Secretary, but it remains unclear whether he will deliver substantive action at the domestic level.

Treasury

The Treasury is arguably the most powerful institution within Whitehall, and under Gordon Brown its influence was extended and strengthened, enforced by mechanisms such as the Comprehensive Spending Review and Public Sector Agreements. It plays a critical role in the environmental policy process, not only as the controller of public expenditure, but also because its approval is needed for almost every significant new policy measure. The Treasury has, however, rarely used its power positively to tackle

environmental issues. Many observers see it as obstructive to environmental policy and too sympathetic to business interests at the expense of the environment.

The environment has not been a spending priority for this Labour Government (or, indeed, any previous government). The environment budget remains tiny compared to the major spending departments such as health and education. In a political world where the size of budgetary allocations is of major importance, the absence of a big settlement for the environment is a hugely significant symbol of its low position on the list of Treasury priorities.

More fundamentally, the relative paucity of the environmental budget is also a major barrier to more effective climate change and biodiversity strategies. Key areas where more spending could make a big difference include:

- R&D and investment in nascent technologies, such as renewable sources of electricity, energy efficiency and microgeneration.
- Home insulation and other domestic measures to improve energy efficiency.
- An affordable, reliable and extensive public transport system.
- The UK Biodiversity Action Plan – current spending is only about 50% of the estimated required budget of £677 million.

As most environmental policy still involves regulation – even emissions trading is a combination of regulation and market mechanisms – the growing opposition of the Treasury to regulation in recent years has been an obstacle to several progressive environmental initiatives from different ministries.

In 1997 the Treasury issued a far-reaching and progressive 'Statement of Intent on Environmental Taxation', which declared that the Government's aim was *'to reform the tax system to increase incentives to reduce environmental damage'* and it promised to increase the proportion of revenues gained from taxing environmentally damaging activities. However, although the Treasury has introduced some innovative measures, the share of environmental taxes as a percentage of GDP was lower in 2005 than in 1997. Importantly, the Treasury needs to relax further its understandable opposition to the hypothecation of tax revenues, as it did in transport policy where it allows money raised from local transport levies to be reinvested in public transport, which is a key principle underpinning the London congestion charging scheme.

The Treasury clearly regards tradable permit schemes as the most effective means of delivering climate change targets. The Renewables Obligation has created a market in Renewable Obligation Certificates (ROCs) and the UK Emissions Trading Scheme (ETS) was the world's first emissions trading scheme. The Treasury has actively supported the EU ETS, promising tougher cuts than many other member states and strongly supporting the inclusion of aviation in the scheme. Whilst emissions trading schemes clearly have a potentially significant role to play in reducing carbon emissions by creating a price for carbon, flaws in existing schemes and the recent volatility of the carbon price indicate that the Treasury should not become overly dependent on one policy instrument. Additional intervention is often needed, for example to move technologies from the R&D

stage through to commercialisation. Market based mechanisms such as ROCs tend to favour technologies that are close to commercialisation and deregulation of utilities markets tips the scales towards existing technologies and infrastructure that have benefited from years of public investment.

Policy Implementation

Government planning has been repeatedly let down by failures in Departmental forecasting, particularly by the DTI. The climate change and biodiversity strategies have both been characterised by numerous implementation deficits, whilst remedial action to address these problems has often been either tardy or unforthcoming.

Lifestyle Change or the Techno-fix?

It is widely recognised that tackling climate change will require major behavioural changes by UK citizens in almost every aspect of their lives – their homes, how they travel and their leisure activities. It will also require changes to infrastructure and institutions that currently favour powerful business interests. The Government will need to make brave decisions if it is tackle these challenges head on, but for the reasons identified above these solutions have not yet been forthcoming.

Rather than encourage this behavioural revolution, the Labour Government prefers to seek the silver bullet of a techno-fix solution, such as nuclear power. Another example, which is the current flavour of the month on both sides of the Atlantic, is biofuel, even though it has many potential flaws as a solution. Yet little attention is given to implementing one of the core principles of the 1998 Transport White Paper: shifting people out of their cars and onto public transport, bicycles or foot. Blair's comments about his family's right to take regular long haul flights revealed an unwillingness to shape the agenda on this fundamental issue.

Conclusion

For most of their decade in power, the environment has been a low priority issue for Labour. Their modest approach has been facilitated by the low salience of the environment in party politics, the weak political opposition, a green lobby that secured limited influence and the negative impact of a powerful business lobby that is still mostly blind to the integral role the environment plays in enabling current and future economic wealth.

Yet the formation of the new Labour Government under Gordon Brown pushes further open an exciting window of opportunity to make a step change in environment policy. The Stern and IPCC reports have publicised the grave implications of climate change for the economy and human livelihoods. The 'Cameron effect' has forced the environment onto the party political agenda and the appointment of David Miliband as Secretary of State for the Environment provided some genuine domestic leadership on climate change policy. The media has seized on the issue, so the green lobby is starting to be heard again, and there are important signs of change amongst some of the more progressive corporate leaders.

There are some concrete results in the form of Government initiatives such as the Climate Change Bill. These initiatives certainly don't add up to a revolution in policy, and Government targets for reducing emission of greenhouse gases fall well short of what the science suggests is needed, but they do show that the Government senses a need to respond to climate change. However, biodiversity loss still seems to be a marginal issue despite its equally catastrophic implications.

These recent changes demonstrate that politics matters in terms of securing more effective action on the environment. The challenge now is for all those concerned about the environment is to keep environmental politics high on the political agenda and to ensure that the current enthusiasm for environmental issues does not become another short-lived 'issue attention cycle', where an issue (re-) emerges from the world of science and activists to grab the attention of mainstream politicians, the media and the public for a while, but then falls off the agenda again as the public becomes aware of the costs of action and their attention switches to the pursuit of another issue.

There are certainly political incentives for all the major political parties to make the environment a central issue at the next general election, when a greener image may appeal to the female and younger voters. Cameron is clearly directing his efforts at these groups and Brown's recent environmental pronouncements indicate that he recognises the need to challenge him on this issue. Although Brown may not have shown any great enthusiasm for the environment as an issue in the past, there are many ways in which it links in to the social justice agenda that he cares about so deeply.

There is also a vital role for the green lobby in pushing Government and mobilising public opinion in order to keep the environment high on the political agenda. Similarly, those corporate leaders who have 'seen the light' must spread the word to the many sceptics in their ranks, although the most effective method of persuasion will probably be to demonstrate by their actions that progressive environmental policies bring economic benefits.

The analysis of environmental governance demonstrates the urgent need for political leadership. Tony Blair provided unprecedented leadership on the international stage, but his domestic impact was limited. Gordon Brown seems to have interpreted the Stern Review as emphasising international *rather* than domestic action, so he is likely to pick up Blair's mantle in international climate change diplomacy, particularly now that he has appointed David Miliband as Foreign Secretary. Yet there is an urgent need for domestic leadership too in order to drive environmental change horizontally across and vertically down through the government machine. Brown must expend some precious political capital in providing this leadership.

If Prime Minister Brown is serious about the environment, then he needs to signal that it is a critical issue for him. His early actions as Prime Minister were disappointing, with no indication that environmental concerns shaped the formation of his first government. Yet if his claim that he is committed to Cabinet Government has substance, then the environment offers the perfect opportunity for Brown and his new Government to

demonstrate a new style of collective leadership, in which old style Departmentalism is replaced by a progressive, genuinely joined-up strategic approach to resolving the twin challenges of climate change and biodiversity loss.

1. Introduction

This report was commissioned by Friends of the Earth and written by independent researchers from the Centre for Ecology, Law and Policy (CELP) at the University of York and the Sussex Energy Group at the University of Sussex. It reviews the most up-to-date science on climate change and biodiversity loss and assesses the Labour Government's performance in tackling these issues since it came to power in 1997. This serves to highlight the actions that Labour, under the new leadership of Gordon Brown, still needs to take in order to avoid catastrophic future impacts of climate change and biodiversity loss.

Chapter 2 begins by summarising the most up to date science on climate change and biodiversity loss. It presents the scientific evidence that demonstrates that climate change and biodiversity loss are real and accelerating problems. It also provides an explanation of why these issues pose such fundamental threats and outlines the catastrophic implications of failing to act quickly to tackle them. Finally, it outlines some of the urgent policy actions that governments throughout the world, including the UK, need to take to tackle these issues.

In Chapters 3 and 4, Government policy on climate change and biodiversity loss since Labour came to power in 1997 is analysed. The structure of each chapter is based on the frameworks laid out in the Government's own climate change and biodiversity strategies. The rationale for this approach is twofold. First, as these strategy documents represent Government policy, they provide a self-defined benchmark against which to assess Government performance. Secondly, the strategies, as we would expect, do cover the central activities that contribute to climate change and biodiversity loss. Of course, climate change and biodiversity loss are both extraordinarily wide-ranging and complex problems, and every policy sector contributes to them to some degree. Even a policy decision as seemingly irrelevant as switching from analogue to digital television has implications for climate change as it has resulted in the widespread use of set top boxes that have increased energy consumption. It was therefore beyond the scope of this report to assess every single policy that has an impact on these problems; inevitably some issues are either ignored or, like waste management, are only addressed in passing.

Chapter 5 provides an analysis of the key political challenges and obstacles to implementing environmental policies that are both sufficiently ambitious and effective to tackle climate change and biodiversity loss within the time frame that the science suggests is necessary. As well as the documentary analysis presented in Chapters 3 and 4, this chapter draws heavily on a set of elite interviews with environmental experts from in and around Government over the last ten years. These experts include people with a wealth of experience as ministers, special advisors, independent advisors, lobbyists, environmental consultants and senior figures within environmental NGOs, as well as two leading British international scientists who also have extensive knowledge of the policy process. Some are Labour supporters, others are not. They are in a no way a representative sample. However, they do all have great knowledge and understanding of environmental politics and governance, and hold strong opinions that they were happy to

share. It is this rich qualitative data that represents one of the distinctive features of this report.

Finally, a short conclusion summarises why the Government has been unable or unwilling to design and deliver the policy necessary to address climate change and biodiversity and reflects briefly on the challenges and lessons for the new Government led by Gordon Brown.

2. The Science of Climate Change and Biodiversity Loss

Key Chapter Messages

1. Climate change and biodiversity loss have dire implications for the future welfare and existence of humanity.
2. There is now overwhelming scientific evidence to support the fact that climate change is happening and is a result of anthropogenic greenhouse gas emissions.
3. UK Government targets for reducing carbon emissions are insufficient to avoid dangerous climate change.
4. Biodiversity loss is accelerating at a rate that threatens the functioning of ecosystems upon which humans rely for essential goods and services that support our economies, process our waste and maintain the climate in such a way as to make human existence on earth possible.
5. Without urgent policy action within the next decade to reverse climate change and biodiversity loss, the next 30 to 100 years are likely to witness catastrophic impacts on the global economy and on human health and wellbeing. In the longer term these issues threaten the feasibility of human existence on earth.

2.1. Introduction

Climate change and biodiversity loss represent two of the most urgent policy concerns of our time. In this chapter we introduce the science behind these two issues and highlight the policy action that is required by government. The purpose of this review is to set out the scientific basis for the need for action on behalf of the UK government to tackle climate change and biodiversity. As both issues are global by nature, both in terms of cause and impact, many of the examples used in this chapter are global, with UK-specific examples used where appropriate.

Biodiversity loss and climate change are intricately linked with both having impacts on the other. For ease of understanding, however, in this chapter we discuss the two issues separately.

2.2. Climate Change

There is now overwhelming agreement amongst the world's leading scientists that climate change is happening and that a lack of urgent action to reduce greenhouse gas emissions will have catastrophic impacts. As the Stern Review (an independent report commissioned by the UK Chancellor of the Exchequer), puts it:

> *'The scientific evidence is now overwhelming: climate change presents very serious global risks, and it demands an urgent global response'*. (Stern 2007: xv)

The UK Government expressed open support for this statement during public appearances made by the Prime Minister, Chancellor of the Exchequer and several other ministers at the launch of the Stern Review in October 2006. The Stern Review also played a central part in the UK and several other governments' representations at the 12th Convention of the Parties to the United Nations Framework Convention on Climate

Change in 2006. Despite this public support for action to combat climate change, however, the action that the UK government proposes to take is based on figures that do not match those supported by the most up to date science.

The 1990s and the early part of the twenty first century have been characterised by a lack of sufficient action on behalf of policy makers and the general public to tackle climate change. One of the key contributors to this inaction has been the huge amount of resources spent by certain actors, most notably the oil industry, on producing alternative scientific interpretations of climate science. These interpretations have played on some of the uncertainties involved in the science in order to argue that there is no need to take action to reduce greenhouse gas emissions.

The arguments of such 'climate sceptics' have, however, been robustly rebutted through recent advances in the scientific understanding of climate change, accompanied by advances in uncertainty analysis. As the review in this chapter will demonstrate, these recent advances demonstrate that it is highly unlikely that mainstream climate scientists are wrong about the urgent need to reduce the greenhouse gas emissions associated with human activity.

A key point to take on board from a policy-making perspective is that, even in the incredibly unlikely event that the world's leading scientists have got it wrong and human greenhouse gas emissions are not causing climate change, the most rational and morally justifiable policy action is still to take action to reduce our carbon emissions. If we take this action and the scientists turn out to have got it right, then we will have averted catastrophic levels of human suffering and a potential situation where the Earth is no longer habitable by humans. In the highly unlikely event that the scientists have got it wrong, then at the very least we will have made a transition towards a clean, low carbon global economy with numerous knock-on benefits for the environment and the security and quality of life of the world's population. As this chapter will demonstrate, there is now little doubt that the scientists have, in fact, got it right and that urgent action is now required to tackle climate change. This urgency is exacerbated by the fact that the climate sceptics have done their job well. Over a decade has now been lost where sufficient action has not been taken to combat climate change.

This section focuses on providing an overview of the most up to date scientific evidence on climate change.[1] It concludes with a discussion of necessary policy responses. In particular, a mismatch is highlighted between the emissions levels that the most up to date science suggests are necessary in order to avoid dangerous climate change and the emissions levels that the UK government is basing its policy response to climate change.

2.2.1. Climate Change is Happening

The following are some of the key areas where convincing scientific evidence exists to suggest that we are currently experiencing the effects of climate change.

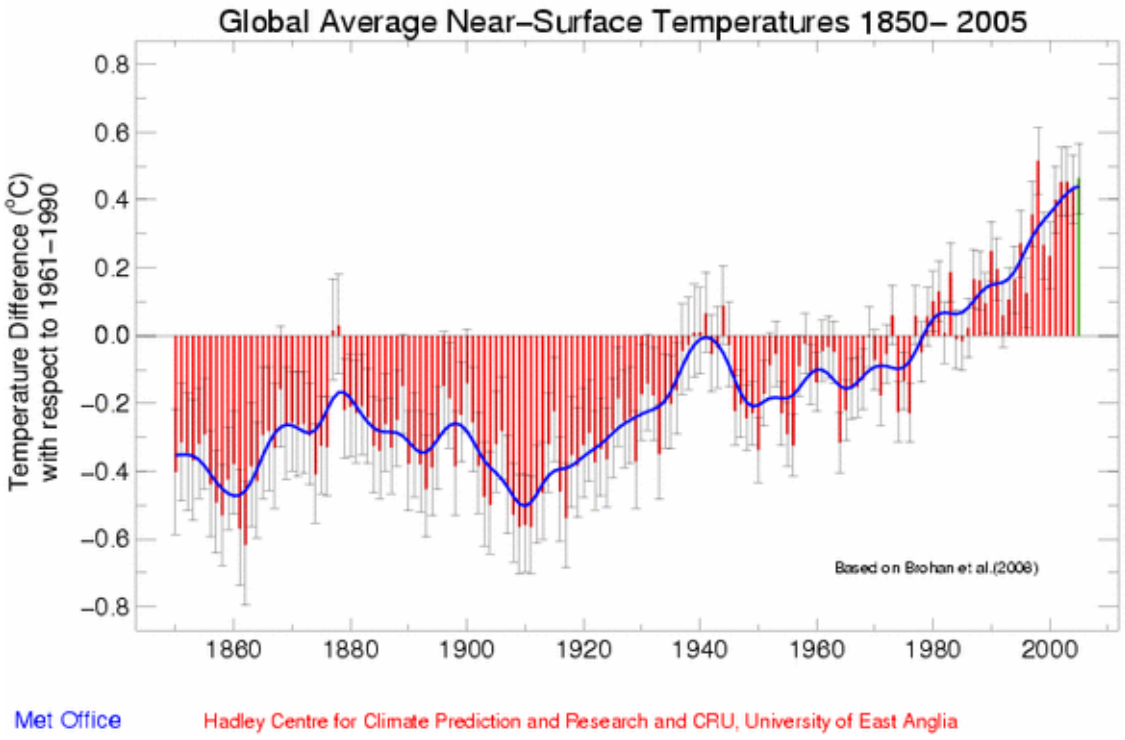
[1] A more detailed discussion of the impact of climate change on biodiversity and ecosystem services is provided in section 2 of this chapter.

Temperature Rises

There is clear evidence to show that mean global temperature is rising. Figure 2.1 illustrates the increases in temperature at the Earth's surface between 1861 and 2005. It shows that the top ten warmest years in this period all occurred since 1990, with 1998 being the warmest, and the top twenty warmest years have all occurred since 1981. Overall the Earth has warmed by 0.7°C since around 1990 (Hadley Centre 2005a). Furthermore, the rate and level of warming in the 20th century is unprecedented relative to at least the last 1000 years (International ad hoc detection group 2005).

Three other independent measurements of global temperature change also exhibit the same warming trends as illustrated in Figure 2.1. These include air temperature over land, air temperature over sea at night, and sea-surface temperature (Hadley Centre 2005b: 26).

Figure 2.1: Increasing Global Temperatures since 1850

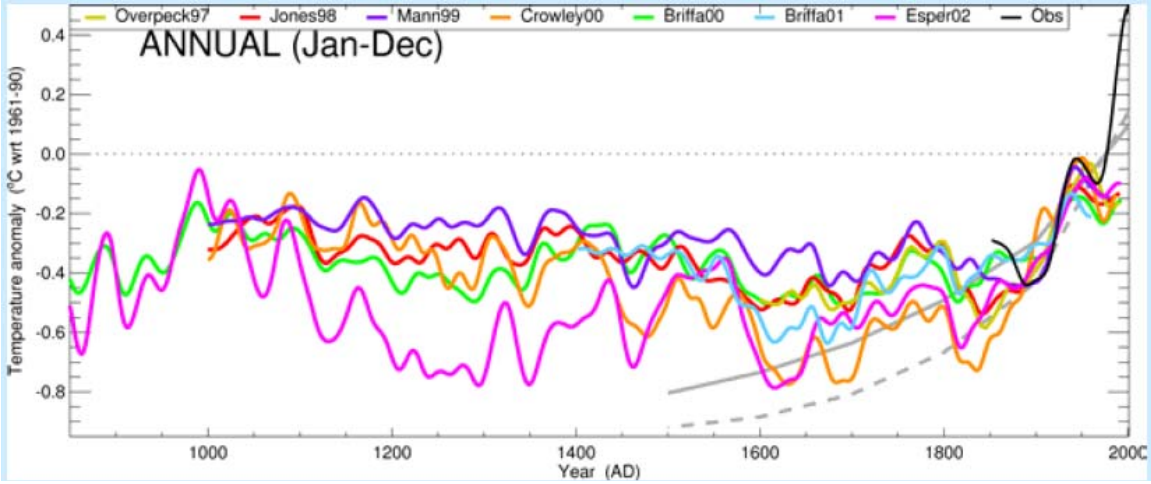


Source: Based on data from Brohan et al. (2006)

Whilst the timescale illustrated in Figure 2.1 is short in geological terms, there is also convincing evidence to suggest that recent temperature increases are also unprecedented over much longer time scales (see Figures 1.2 and 1.3). This has spurred a lot of debate around whether recent temperature rises are unprecedented or whether they represent natural variations. This is sometimes referred to as the 'Hockey Stick' debate due to graphs that show a hockey stick shaped curve where temperatures rise sharply after 1850. Figure 2 shows a number of such curves taken from different studies. Some people see these graphs as clear proof of the impact of human beings on global warming. Others

question the validity of such graphs as pre-1900 data is based on reconstructions from ice cores, tree rings and so on as opposed to actual observations (see, for example, von Storch et al. 2004).

Figure 2.2: 'Hockey Stick' graphs of recent global temperature rises based on reconstruction of annual temperature changes in the Northern Hemisphere for the past millennium using a range of proxy indicators by several authors

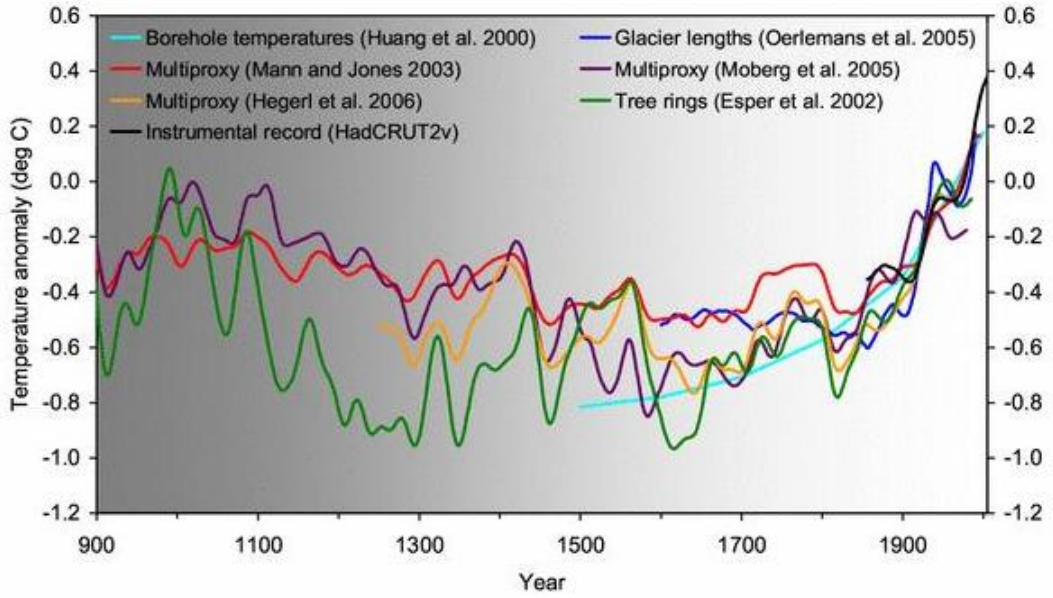


Source: International ad hoc detection group (2005)

Whether or not recent warming is unprecedented is arguably a distraction from the most important element of the climate change debate, which is more concerned with the level of future warming that will occur as greenhouse gases continue to build up in the atmosphere[2] (Stern 2007: 7-8). Nevertheless, a committee of the US National Research Council that was recently convened to report on this matter to the US Congress found that, with a high level of confidence, it is possible to conclude that the global mean surface temperature during the last few decades is higher than at any time during the last four centuries (National Research Council 2006: 3). Beyond the last four hundred years, at a global level, they found that confidence begins to diminish, in particular beyond A.D. 900. In some regions, however, they found that temperature rises are unambiguously shown to be unprecedented over the past 1000 years(See Figure 2.3). They cite their findings as being broadly in support of Mann et al.'s (1999) assertion that recent warming is unprecedented over the past 1000 years. They also state that much of the evidence suggests recent warming is unprecedented over the last 2000 years (National Research Council 2006: 3).

[2] The relationship between greenhouse gas emissions and global temperature is dealt with in more detail below.

Figure 2.3: Surface Temperature Reconstructions for the Last 2000 Years



Source: National Research Council (2006)

There was some debate in the past as to whether observed increases in global temperatures might be due to urbanisation. This was based on the hypothesis that weather monitoring sites that were originally located away from urban areas are now increasingly surrounded by human activity and thus subject to the urban heat island effect. This hypothesis has, however, been disproved due to the fact that the trend in daily night time minimum temperatures over the last 50 years remains constant at low and high wind speeds (Parker 2004). If an urban heat island effect were present, high wind speeds would have resulted in a cooling effect.

Changes in the temperature of the Earth's surface and lower atmosphere can have a series of knock on effects on other climatic properties. These could include a range of catastrophic effects such as increased frequency of extreme weather events like flooding and drought, rises in sea levels and increased intensity of hurricanes. These impacts could make many parts of the world uninhabitable and impose heavy costs on current and future generations. Observed changes in the Earth's climate to date are outlined below.

Changes in Precipitation

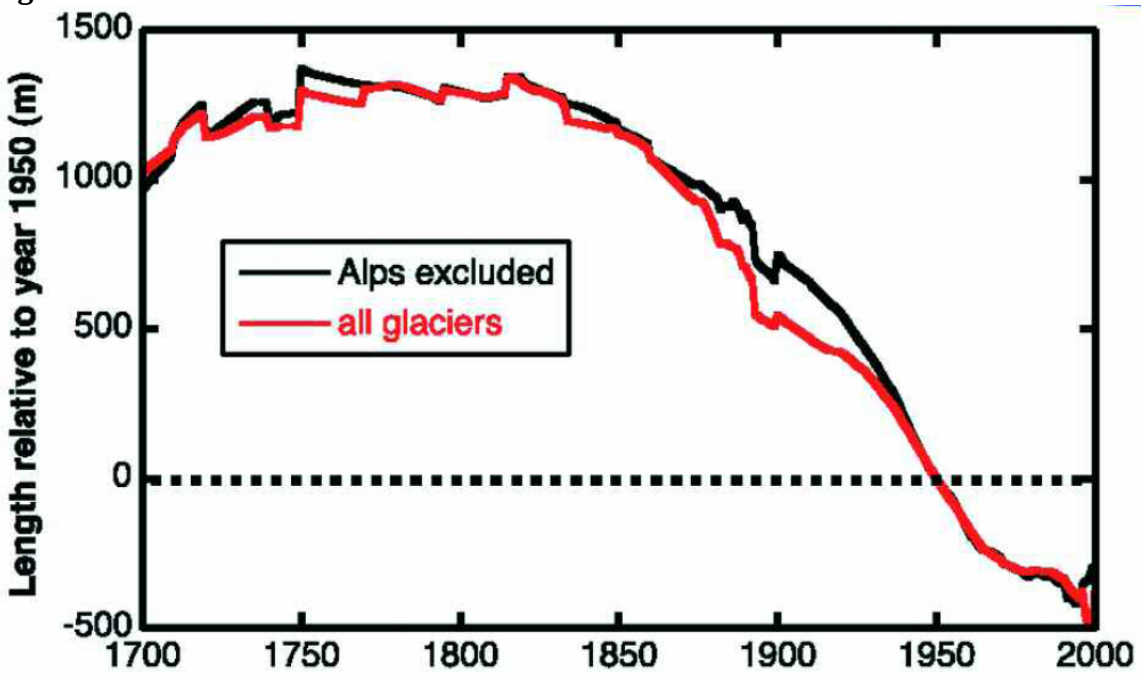
Increasing temperature rises are associated with changes in patterns and levels of precipitation and atmospheric moisture. This is partly because warm air holds more moisture and partly because the different distribution of warming around the world will lead to changes in large-scale weather events (Stern 2007: 17). Generally speaking, warming is expected to cause increased precipitation at high latitudes and decreased precipitation in the subtropics. The impact on the tropics is uncertain and will depend on the complex interaction between climate and events such as El Nino. The most comprehensive and respected global scientific assessment panel, the Inter-governmental

Panel on Climate Change (IPCC 2007a: 8) reports significant increases in precipitation between 1900 and 2005 in eastern parts of North and South America, northern Europe and northern and central Asia at the same time as drying in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. The IPCC also reports a corresponding increase in atmospheric water vapour (a strong greenhouse gas) over the last few decades based on satellite and weather balloon data. Cloud cover in the Northern Hemisphere has increased by around 2% since the beginning of the 20th century.

Decreased Snow and Ice Cover

Positive correlations have been observed between increasing global temperatures and the level of snow and ice cover on land. Snow and ice cover is decreasing (IPCC 2007b: 43), as illustrated by the retreat of mountain glaciers. This is illustrated in Figure 2.4.

Figure 2.4: Retreat in Mountain Glaciers since 1800



Source: Oerlemans (2005)

Oerlemans (2005) reports that between 1900 and 1980, 142 of 144 glaciers for which adequate data is available decreased in length. Between 1860 and 1900 only 35 out of 36 glaciers retreated in length but at a rate of retreat much lower than that observed during the 20th century. In 2001 IPCC (2001a) estimated that since 1980 rapid retreats have continued to be observed, for example in Alaska where rates of around 14km per year have been observed and Greenland where rates of around 5km per year have been observed. The IPCC nowestimates that actual rates of retreat are in fact 40% higher than reported in 2001 (IPCC 2007c: 356).

At the same time as snow and ice on land is retreating, sea-ice is also decreasing. This is particularly severe in the Arctic. The Hadley Centre reports that, since the mid-1970s, Arctic sea ice has decreased by around 1 million km^2 (Hadley Centre 2005b: 36), which

is equivalent to a reduction of around 2.5% per decade. The most recent IPCC report (2007c: 8) confirms the observations it reported in 2001 with regard to sea ice. It states that since 1978 annual average Arctic sea ice extent has shrunk by an average of 2.7% per decade, with larger decreases in the summer of 7.4% per decade.

Sea Level Rise

As the temperature of the sea increases, the water expands and causes sea levels to rise. Sea levels also increase as the mass of water increases. This can occur from an increased influx from the land as land ice recedes. It can also occur as a result of melting of sea ice. The IPCC (2007c: 7) report sea level rises, based on tide gauge data, of 1.8mm per year between 1961 and 2003 and rises, based on satellite data, of 3.1mm per year between 1993 and 2003 suggesting a significant increase in rates of sea level rise over the last decade. This compares to an estimated rate of only 0.5mm/yr over the last 6000 years (IPCC 2001b: 11).

Tropical Storms

Recent research (Emanuel 2005) has shown that the power displaced by tropical storms has increased markedly since the 1970s. This is highly correlated with increasing sea-surface temperatures. A recent survey by Webster et al. (2005) showed that there has been roughly double the number of hurricanes that fall under the two most intense categories in the last 35 years. The largest increases have been observed in the North Pacific, Indian and Southwest Pacific Oceans. The smallest increases were observed in the North Atlantic. It should be noted, however, that both these papers have relatively short observational periods and the role of natural cycles of hurricane activity and the balance between natural and man-made influences is still a matter for debate (Hadley Centre 2005b: 36).

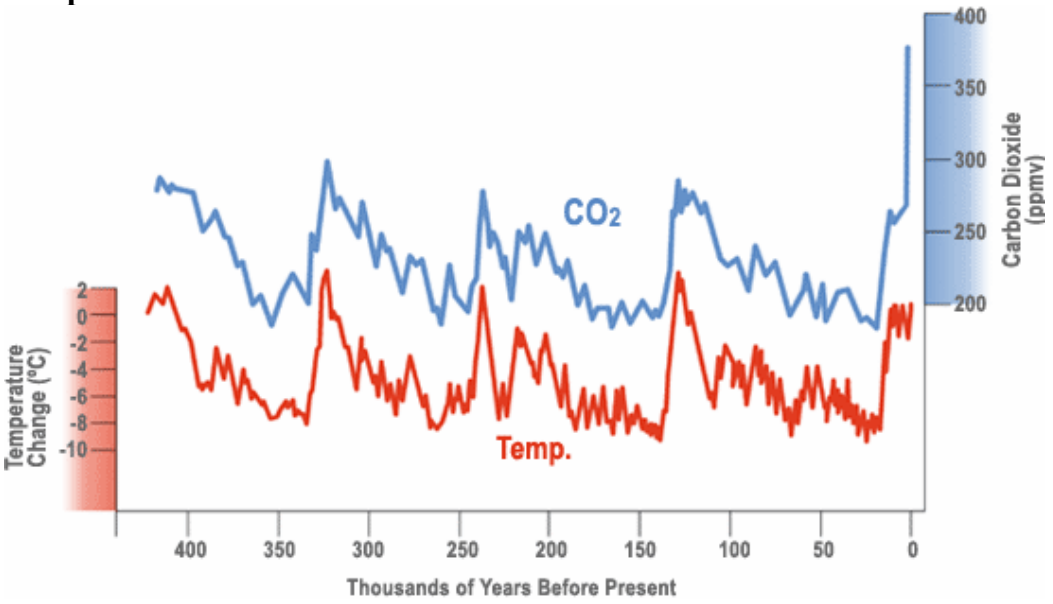
2.2.2. What Causes Climate Change?

The temperature at the Earth's surface changes according to the balance of various forcing agents in the Earth's atmosphere. Some agents contribute to atmospheric warming whereas others have a cooling effect. The principal concern amongst scientists is that the concentration of those agents that have a warming effect is increasing thus resulting in global warming.

The agents in the Earth's atmosphere that drive global warming are known as 'greenhouse gases'. Greenhouse gases act in the same way as a greenhouse by trapping radiation that has been reflected away from the Earth's surface rather than allowing it to escape back out into space. This causes the Earth's surface and lower atmosphere to heat up. The two main greenhouse gases are carbon dioxide (CO_2) and water vapour. Methane, nitrous oxide and a few other gases also act as greenhouse gases.

The relationship between greenhouse gases and global temperature is well established. This is illustrated by Figure 2.5 which clearly shows how temperature trends closely follow trends in atmospheric CO_2 concentrations. As will be discussed below, there is a time lag between increases in CO_2 concentrations and increases in temperature. This explains the divergence between the two lines at the far right of Figure 2.5.

Figure 2.5: Relationship between Atmospheric CO_2 Concentrations and Global Temperature



Source: IPCC (2001c) and
http://www.architecture2030.org/current_situation/current2.html

The contribution of different greenhouse gases to global warming depends on their lifetime (the time they persist in the atmosphere), the amount of extra outgoing radiation they absorb and their density. Greenhouse gases tend to be measured based on their contribution to global warming relative to 1kg of CO_2. This is known as their 'global warming potential'. Current estimates for the different greenhouse gases are (Hadley Centre 2005b: 18):

CO_2:	1 (by definition)
Methane:	23
Nitrous oxide:	296
CFC12	7300
SF_6	22200

This means that different greenhouse gases will have different impacts on global warming over the next 100 years depending on their global warming potential and their concentrations in the atmosphere. According to the Hadley Centre (2005a: 18), the expected warming effect of the different gases over the next hundred years based on current atmospheric concentrations is as follows:

CO_2:	63%
Methane	24%
Nitrous oxide	10%
Others	3%

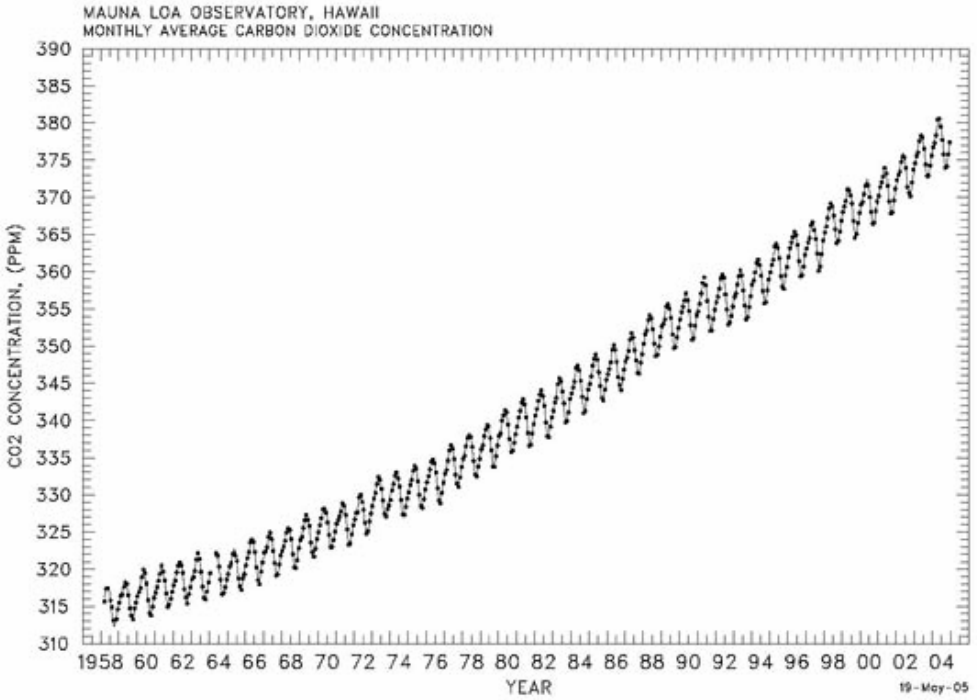
The fact that different greenhouse gases have different lifetimes over which they remain in the atmosphere also means that there is a time lag between the emission of greenhouse gases and their ability to drive climate change. CO_2 has a long lifetime. This implies that even if CO_2 emissions were stabilised at today's levels, CO_2 concentrations would continue to creep up. This is an important policy consideration due to its implications in terms of the level of emissions reductions that would be required to meet different target levels of atmospheric greenhouse gas concentrations.

2.2.3. How are Humans Contributing to Climate Change?

Considerable advances in climate science over the last five years have led the IPCC to report that it is now possible to conclude with very high confidence (i.e. there is a 9 in 10 chance) that the global average net effect of human activities since 1750 has been one of warming (IPCC 2007a: 5). Human activities since the industrial revolution, including, as discussed further below, burning fossil fuels, land use changes and agriculture, have contributed to increased emissions of greenhouse gases over and above what would be observed naturally. Based on evidence from ice cores, the concentration of CO_2 in the atmosphere remained constant at 280ppm (parts per million) for 800 years prior to the industrial revolution. Since the industrial revolution in the 1800s this has risen to 380ppm in 2004 (Hadley Centre 2005b: 15; Stern 2007). A similar pattern has been observed for other greenhouse gases. Atmospheric concentrations of methane have risen from 800ppb (parts per billion) 200 years ago to a current level of over 1750ppb. Nitrous oxide has risen from a pre-industrial concentration of 270ppb to a current level of 310ppb. And low level (tropospheric) ozone is estimated to have increased by approximately 30% over the same time period. The total warming effect due to all greenhouse gases covered by the Kyoto Protocol (the international agreement committing signatories to decrease greenhouse gas emissions) is estimated to be 430ppm CO_2 equivalent and is rising by 2.33ppm a year (Stern 2007: 5).

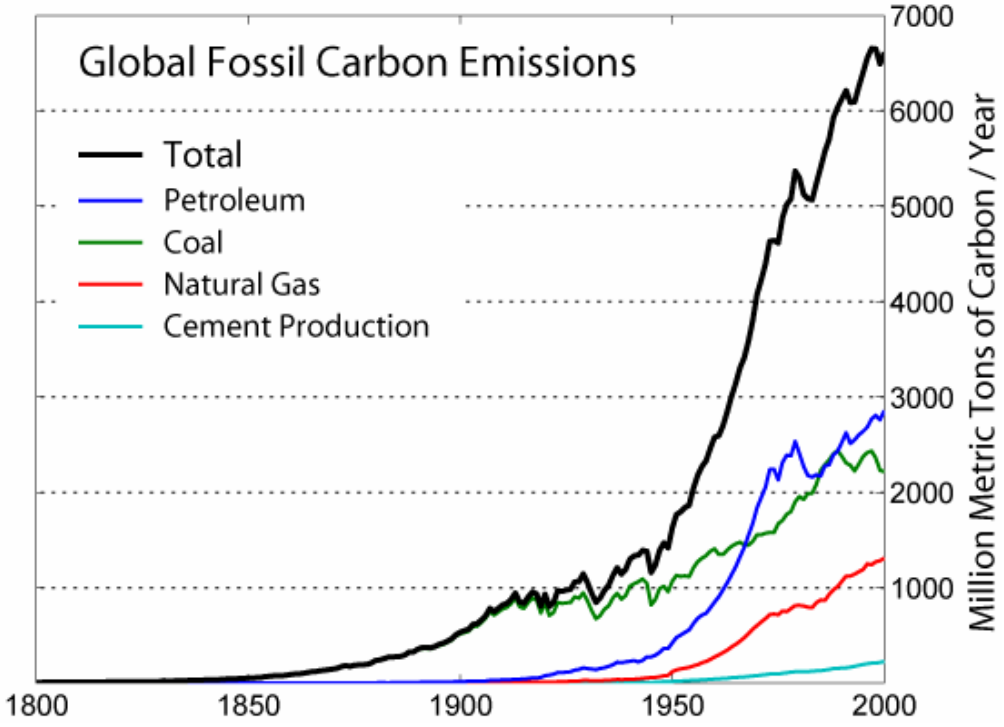
Based on analysis of ice cores, Siegenthaler et al. (2005) have shown that greenhouse gases in the atmosphere are now at their highest levels for at least the last 650,000 years. Recent analysis by the same researchers suggests, however, that current levels of carbon dioxide in the atmosphere are actually unprecedented for the last 800,000 years (Stern 2007: 5). Figure 2.6 shows the most famous graph demonstrating increases in the atmospheric greenhouse gases since 1958 measured at the Mona Loa observatory in Hawaii. This demonstrates a steady increase in atmospheric carbon emissions.

Figure 2.6: Increasing Atmospheric Carbon Dioxide Concentration since 1958



Source: http://www.aip.org/history/climate/images/maunaloa.jpg

Figure 2.7: Increased Carbon Emissions from Burning Fossil Fuels since 1800



Source: based on Marland et al. (2003)

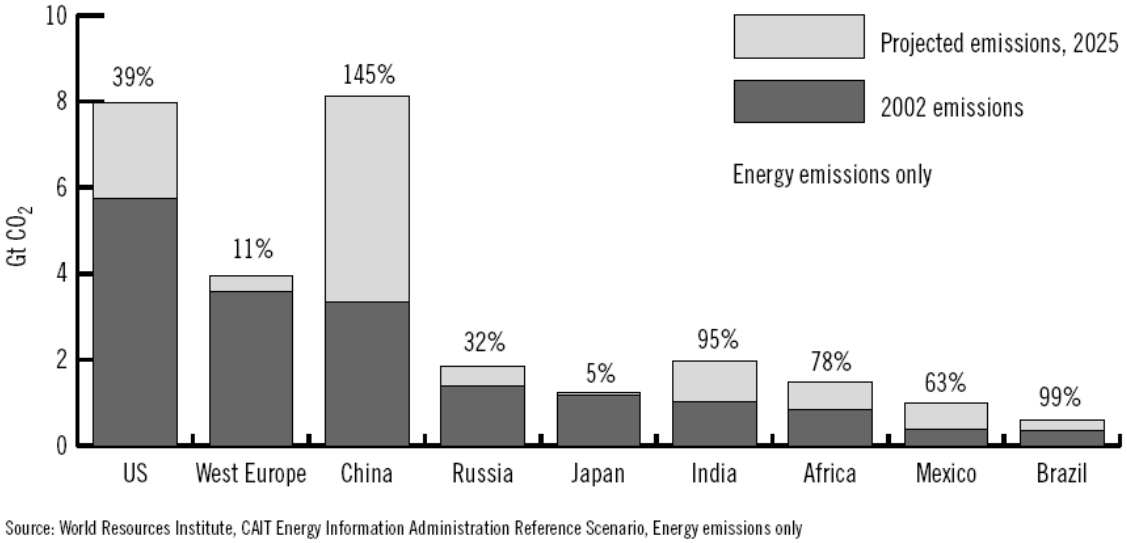
Human sources of these greenhouse gases have principally been from the burning of fossil fuels, land use changes and agriculture. Figure 2.7 illustrates the extent of recent increases in carbon emissions from fossil fuels. As human population and energy use per person continue to increase rapidly, so do human greenhouse gas emissions. The proportion of greenhouse gases (CO_2 equivalent) associated with different human activities are currently (Stern 2006: 1):

61%	(25.6Gt)	Energy (fossil fuels) comprised of: Electricity & heat generation Transport Industry Other energy
18%	(7.6Gt)	Land use changes (mostly from deforestation)
14%	(5.6Gt)	Agriculture (mostly from soils & livestock)

The fastest growing sources are transport and electricity generation.

As Figure 2.8 illustrates, current and future emissions of CO_2 are not uniformly distributed between countries. Rich countries dominate current emissions and in future the US is likely to remain comparable to the emissions levels of currently rapidly developing nations like China. It also shows that emissions from developing countries are likely to rise more rapidly than emissions from developed nations.

Figure 2.8: Current and Future Emissions of CO_2 from Energy Use by Country



Source: Taken from Stern (2006)

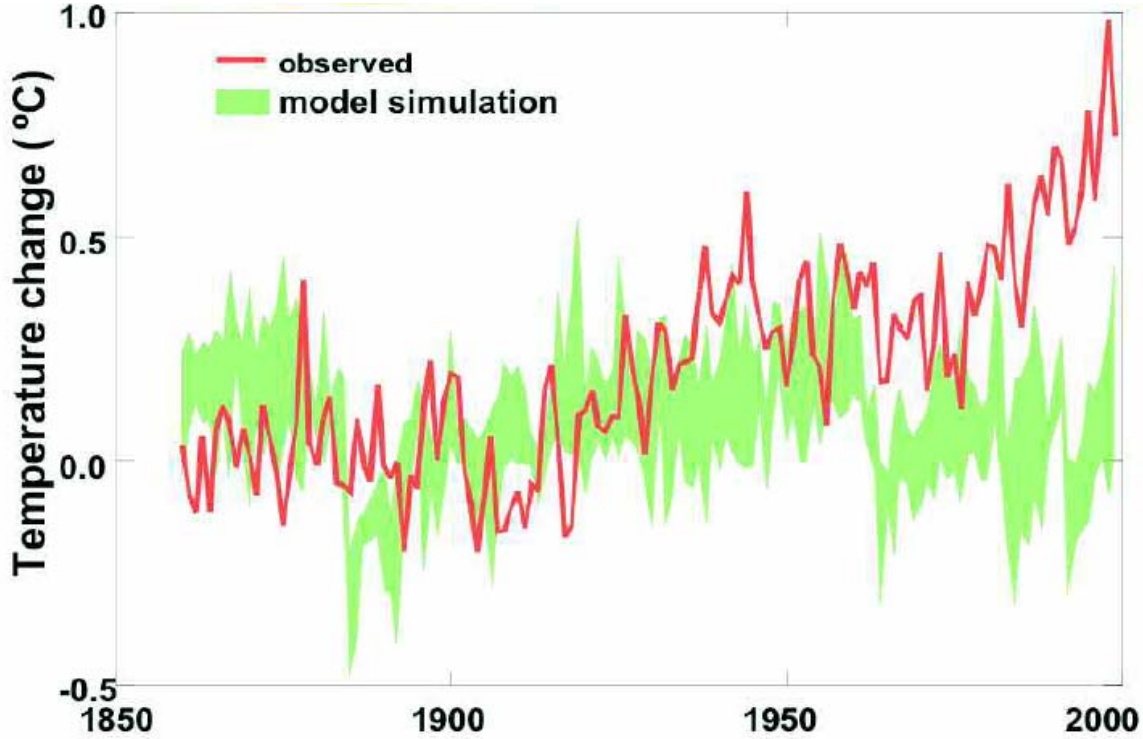
Human activities also produce agents that have negative feedbacks, or a cooling effect on the atmosphere. This is through the emission of sulphate particles from industry and transport (Hadley Centre 2005b: 19). These have a cooling effect in two ways. Firstly, they scatter sunlight back into space. Secondly, they result in the formation of clouds with more small droplets and therefore a greater surface area to reflect sunlight away

from the Earth. However, sulphates only remain in the atmosphere for up to two days and there is also likely to be a large reduction in the amount of sulphates emitted from Asia and other rapidly industrialising nations in future due to their negative health and environmental impacts. This is likely to have a warming effect adding to that caused by greenhouse gases (Hadley Centre 2005b: 20).

As well as the simple fact that the level of greenhouse gases in the atmosphere has increased rapidly since the industrial revolution, there are ways that scientists can show that this increase is extremely likely to be human-related. For example, because the carbon contained in fossil fuels is much older than that occurring naturally in the atmosphere, it possesses lower levels of radioactivity. By studying the carbon in tree rings since 1850, scientists have been able to prove that increased concentrations of CO_2 in the atmosphere are a result of burning fossil fuels (Baxter and Walton 1970; Damon et al. 1973). The hemispheric gradient of atmospheric carbon dioxide, which is weighted towards the northern hemisphere, also supports the fact that increased CO_2 is a result of human activities (Hadley Centre 2005b: 15; IPCC 2007c).

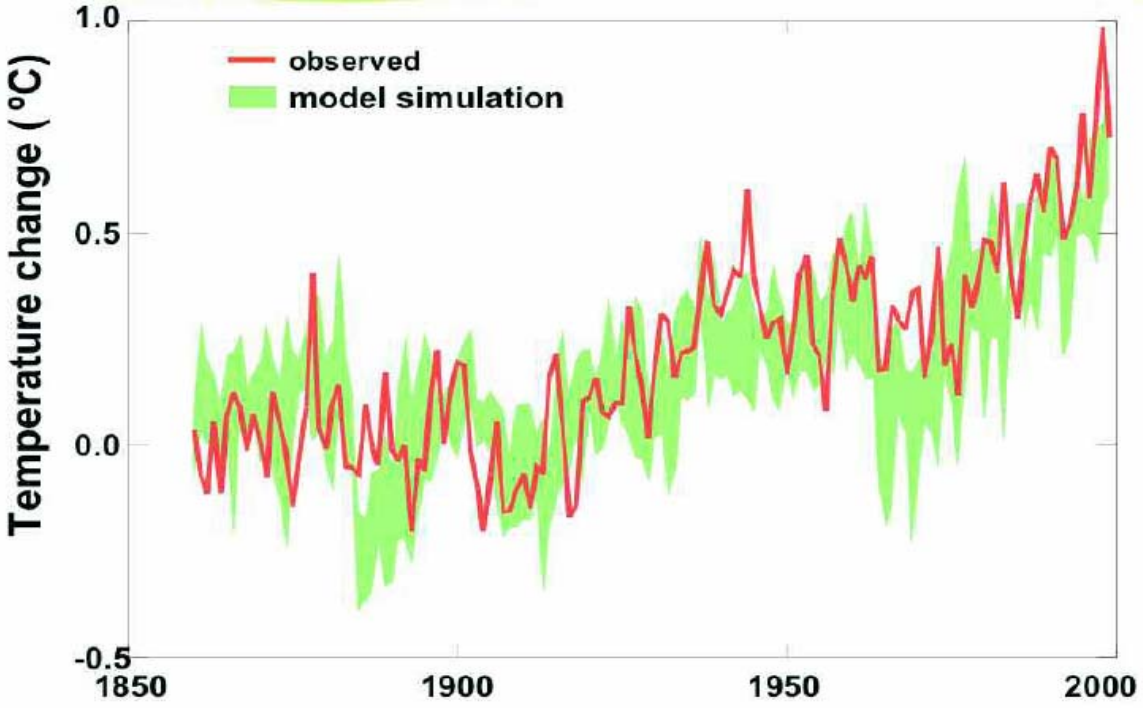
Another source of convincing evidence that supports the fact that human emissions are driving recent global warming is based on climate models. Climate models are extremely powerful computer based models that attempt to model the behaviour of the Earth's climate on the basis of a wide range of different climatic variables. These can include natural factors that influence the climate as well as man-made factors. When these models are used to predict past temperature changes, they are fairly accurate and tend to mirror actual observed temperature trends. Figure 2.9 illustrates predicted temperature changes based on the Hadley Centre climate model. The figure shows how, when only natural factors are included in the model, post-1900 predictions are not very accurate. However, when man-made factors are included in the model, as illustrated in Figure 2.9, recent temperature increases are more accuratelypredicted by the model. The Hadley model can also only predict ocean temperature changes when human factors are included. Furthermore, using only man-made greenhouse gases plus man-made aerosols enables as good a prediction as man-made plus natural factors, suggesting that man-made factors are mostly to blame for current warming trends (Hadley Centre 2005b: 31).

Figure 2.8: Climate Models Cannot Explain Recent Global Warming Based on Natural Factors



Source: Hadley Centre (2005a: 28)

Figure 2.9: Climate Models Can Only Explain Recent Global Warming When Man-Made Factors are Included In



Source: Hadley Centre (2005a: 29)

2.2.4. Future Climate Change Impacts

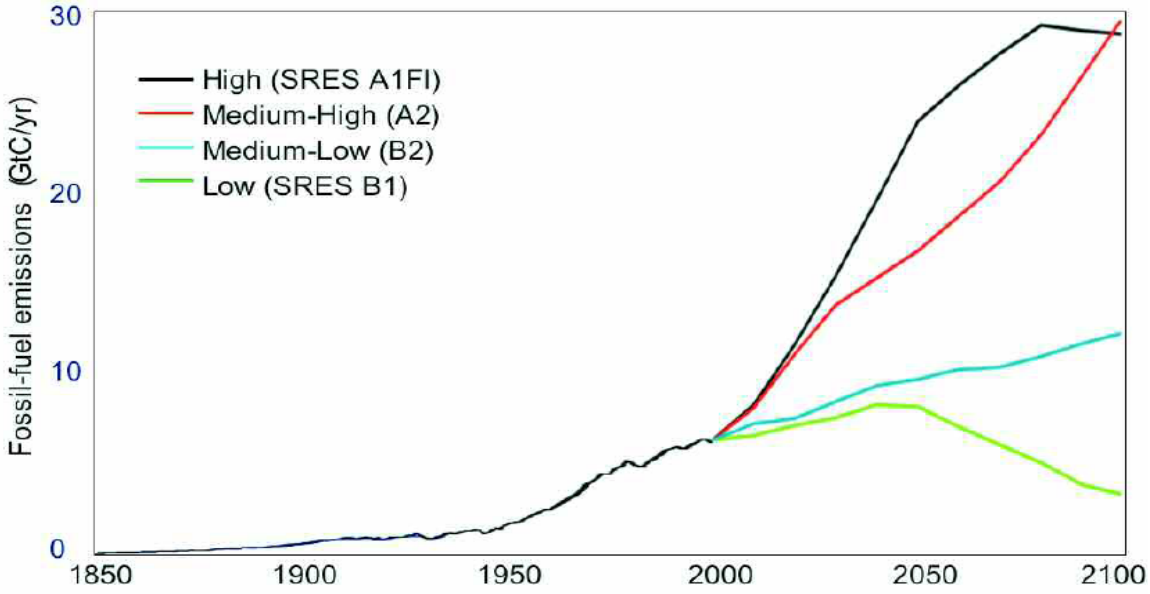
The current observations of climate change outlined above are a cause for concern. Of far greater concern, however, are the potential future impacts of climate change based on current and future emissions of greenhouse gases. The extent of future emissions depends on a range of assumptions about population growth, economic growth, energy prices, patterns of energy use and the carbon intensity of future adopted energy technologies. As it is impossible to predict exactly what future emissions will be, predictions of the future impacts of climate change are based on a range of possible scenarios. The emissions scenarios are then fed into computer models of the climate system that are based on basic physical laws in order to predict possible future climate change. These different scenarios therefore provide a range of estimates of likely future impacts and characteristics of climate change.

The majority of climate change predictions are based on the four emissions scenarios presented in the IPCC's SRES (Special Report on Emissions Scenarios) (IPCC 2000). The four scenarios, which refer to CO_2 equivalent emissions, are:

B1 - Low
B2, - Medium-low
A2 - Medium-high
A1FI - High

As the IPCC stresses, it is not possible to attach probabilities to these different scenarios, they are dependent on a range of variables such as population growth, economic growth, energy use and the carbon intensity of future technologies. Figure 2.10 illustrates emissions levels under each scenario. Under these scenarios, CO_2 concentrations would increase from 380ppm today to anywhere between 540-970ppm by 2100.

Figure 2.10: Future Emissions Levels Under IPCC Emissions Scenarios



Source: Hadley Centre (2005a: 39)

Most climate models predict that a doubling of pre-industrial levels of greenhouse gases would result in a rise in mean global temperatures of around 2-5^{o}C (Hadley Centre 2005b: 39; Stern 2007: 3). Based on an analysis of six different climate models, the IPCC (2001a) reported predicted warming by 2100 of between 1 and 6^{o}C. Improvements in modeling have increased the accuracy of this prediction. The IPCC's most recent report therefore refines the earlier value to a temperature increase of anywhere between 1.1^{o}C and 6.1^{o}C, depending on future emissions of greenhouse gases (IPCC 2007a: 13) A temperature change of 5^{o}C is outside the experience of human civilization and comparable to the difference between today's temperature and that of the last ice age. Based on current trends and emissions scenarios, a doubling of pre-industrial greenhouse gas concentrations is likely to be reached somewhere between 2030 and 2060. Furthermore, if emissions remained at their current levels, greenhouse gases would more than treble relative to pre-industrial concentrations by 2100 leading to warming of anywhere between 3-10^{o}C (Stern 2007: 2). Even at the lowest projected man-made emissions scenario, warming over the next 100 years is likely to exceed any natural variations in temperature observed over the last 1,000 years (Hadley Centre 2005b: 39). It should be noted that these global average figures hide significant regional variations in temperature. The effects on local climate and weather patterns are likely to be more extreme than these apparently small changes in temperature suggest. For example, above average temperature changes are likely to be observed in continental areas with some of the largest changes observed in the Arctic.

Climate Sensitivity within Models and Risks of Catastrophic Feedbacks

The accuracy of different climate models depends in large part on their treatment of 'climate sensitivity'. This refers to a model's treatment of the impacts of a doubling of atmospheric carbon concentrations on temperature once the climate reaches equilibrium. The IPCC have reported that climate sensitivity could be anywhere between 2 and 4.5^{o}C (IPCC 2007b: 63). Many models use the midpoint of the IPCC's previous 2001 estimate of between 1.5 and 4.5^{o}C i.e. (Forrest 2005). This implies that if climate sensitivity is in fact higher than 2.8^{o}C, as the slight increase in the IPCC's 2007 report as well as many other reports suggest (see, for example, Knutti et al. 2002; Murphy et al. 2004; Stainforth et al. 2005; Annan and Hargreaves 2006; Forest et al. 2006), then the impacts estimated by models will be considerably under-estimated. This results in huge ranges of uncertainty within climate models depending on what level of climate sensitivity is assumed. Hence some of the more extreme possible future climate events may be more likely than previously thought and cannot therefore be excluded.

Models also have to account for the risk of climate feedbacks as a result of temperature rises over and above the basic warming effect of greenhouse gases. These feedbacks are inherently difficult to predict as they rely on hugely complex and uncertain climatic dynamics. Feedbacks can be positive (having a warming effect) or negative (having a cooling effect). For example, of the 7GtC/yr currently emitted by humans, 2GtC/yr is stored by vegetation and 2GtC/yr is stored by the oceans. Increased temperature and precipitation is likely to change this situation. Under the right conditions, increased CO_2 will fertilise vegetation thus speeding growth and leading to increased levels of carbon

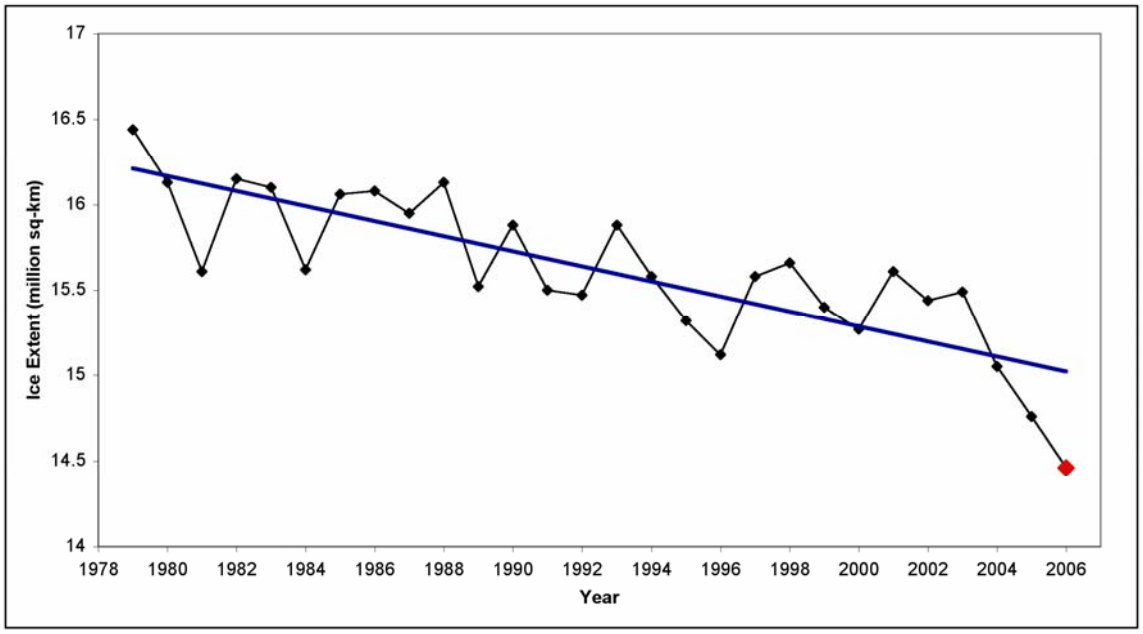
sequestration. Increased temperatures and precipitation at high latitudes will also increase growth of forests in these areas thus sequestering yet more CO_2. In other words, a negative climate feedback would be observed.

However, as soils get warmer, the microbial action that breaks down humus works faster leading to more CO_2 being emitted. This would eventually result in soils becoming a net emitter of CO_2 thus leading to a positive feedback that would start to accelerate global warming. Higher temperatures and lower rainfall in tropical areas would also lead to positive feedbacks as forests begin to die back and emit carbon back into the atmosphere. In an extreme case, the land could become an additional source of carbon emissions by 2050 leading to 50% more warming (Cox et al. 2000). Whilst climate models unanimously agree that climate change will reduce the natural absorption of CO_2 by the biosphere (i.e. via oceans, vegetation and soils), their treatment of these positive and negative feedbacks, or 'climate sensitivity', constitutes the main reason why climate predictions vary between different models (Hadley Centre 2005b:.61).

In particular, uncertainty exists around changes in cloud cover which could act as a powerful climate feedback. Increased low cloud cover would have a negative feedback whereas increased high cloud cover would have a positive feedback (Hadley Centre 2005b: 54). Generally speaking, a warmer atmosphere would be able to hold more water vapour which is a powerful greenhouse gas, thus accelerating warming. It was suggested by some observers (see, for example, Lindzen 1990) that a negative feedback might in fact be observed in relation to water vapour as, in the upper atmosphere, it dried up with warming. However, recent evidence based on re-analysis of satellite data suggests that the reverse is actuallyhappening (Soden et al. 2005).

Other positive feedbacks from global warming include the melting of oceanic ice sheets resulting in less solar radiation reflected away from the Earth's surface. The radiation would instead be absorbed by the ocean resulting in further warming. In March 2006, scientists at the National Snow and Ice Data Center (NSIDC) at the University of Colorado announced the lowest Arctic winter sea ice extent since the beginning of the satellite record in 1979. This is illustrated in Figure 2.11.

Figure 2.11: Decreasing Arctic Winter Sea Ice Extent since 1979



Source: NIDSC (2006)

At their very extreme, these positive and negative feedbacks could result in 'tipping points' being exceeded. Tipping points include events such as the conversion of vegetation and soils from sinks to sources of CO_2 mentioned above. Other possible tipping points include the melting of permafrost to expose peat soils which could release catastrophic amounts of methane into the atmosphere. The current store of methane is greater than all historical emissions of greenhouse gases. Large scale melting of permafrost has already been observed in Siberia raising fears of just such a tipping point already being approached (Pearce 2005).

Another possible extreme tipping point is the switching off of the 'gulf stream' or 'North Atlantic drift'. This would have extreme impacts on large parts of northern Europe, including the UK, by significantly reducing minimum winter temperatures. There is strong evidence that this happened more than once in the last ten thousand years (Hadley Centre 2005b: 59). However, the majority of climate models predict that the Gulf Stream will slow down under future warming scenarios but not switch off entirely (Hadley Centre 2005b: 60).

Climate Change under Future Emissions Scenarios

As warming under different future emissions scenarios occurs, climate models predict a range of different climate impacts. Most models predict that global average precipitation will increase over time at high latitudes with the Indian monsoon seeing the greatest increase in precipitation and the subtropics seeing the least change (see, for example, Johns et al. 2003). Confidence in specific changes in rainfall from climate models is not as great as for temperature predictions. The main models all predict large changes, but do not agree where the changes will be (Hadley Centre 2005b: 41).

In terms of future sea level rise, using estimates from seven different climate models the IPCC (2001a) found a central value of 0.5m rise in sea level, which is the equivalent of two to four times the rise observed in the 20th century. There was, however, a high degree of variability between the most and least sensitive models using the lowest and highest emissions scenarios. In their most recent report, the IPCC predicts global average sea level rise by the end of this century of anywhere between 0.18m and 0.59m depending on emission scenario (IPCC 2007a: 13).

Another impact of climate change could be an increase in ocean acidity. This would occur as oceans absorb increasing amounts of man-made CO_2 from the atmosphere thus increasing oceanic concentrations of CO_2. When CO_2 is absorbed from the atmosphere it acidifies ocean water. The Hadley coupled climate-carbon model was used to predict surface pH of the ocean between 1860 and 2100. This predicted a reduction in pH of 0.1 from 1860 to the present, which is roughly in line with actual observations. The model predicted further reductions in pH (i.e. increasing acidity) of 0.25 by 2100 (Hadley Centre 2005b: 52). This would have a significant negative impact on many marine animals, including many corals and shell fish (Orr et al. 2005).

Oceanic absorption of CO_2 is likely to happen more rapidly as ice sheets melt under future warming scenarios thus decreasing the amount of heat that ice sheets otherwise reflect back from the Earth's surface. For example, the Hadley climate model predicts that under the IPCC high emissions scenario, the Arctic summer ice sheet will have almost disappeared by the 2080s (Hadley Centre 2005b: 43). A further positive feedback could be observed as oceanic concentrations of CO_2 increase. This would result from the oceans being able to absorb less CO_2 thus leaving more CO_2 in the atmosphere and speeding warming. Increased ocean acidity will additionally act to decrease CO_2 uptake thus exacerbating the problem yet further (Hadley Centre 2005b: 52).

2.2.5. Safe Emissions Levels – What Should Policy Be Aiming For?

A key question for policy makers is how much we need to reduce greenhouse gas emissions in order to avoid dangerous future climate change. The first point to bear in mind is that, due to the long lifetime of CO_2 and other greenhouse gases in the atmosphere, we are already committed to a certain level of warming even if emissions were stopped altogether today. Even the ambitious target of stabilising emission levels at 1990 levels would still lead to a significant rise in atmospheric concentrations of CO_2.

It is generally accepted that warming of any more than 2ºC above pre-industrial temperature levels will result in huge costs to humanity. The EU has therefore committed to avoiding warming any greater than this level:

> *'The European Council acknowledges that climate change is likely to have major negative global environmental, economic and social implications. It confirms that, with a view to achieving the ultimate objective of the UN Framework Convention on Climate Change, the global annual mean surface temperature increase should not exceed 2ºC above pre-industrial levels'.* (EU 2005, conclusion 43, p.15)

This commitment then begs the question as to what the appropriate level of emissions reductions is in order to avoid 2°C warming. Consider, for example, the range of possible impacts that different temperature rises would cause. The following table (Table 2.1) presented in the Stern Review (2007), and based on Schneider and Lane (2006) attempts to characterise some of the impacts that might be observed at different levels of global warming. Note, however, that the temperature increases in Table 2.1 are presented relative to 2000, rather than pre-industrial temperature levels. It is clear to see from Table 2.1 why many people cite temperature rises of any more than 2°C as potentially catastrophic.

Table 2.1: Potential Impacts of Rapid Climate Change at Different Levels of Temperature Change

Global Temperature Increase (relative to 2000)	Potential Impact
2 – 3°C	Onset of melt of Greenland Ice Sheet, increasing sea levels by 75cm by 2100 and causing eventual additional sea level rise of 7m over millennia
	Collapse of Amazon rainforest, with forest replaced by savannah, leading to significant consequences for biodiversity and human livelihoods
2 – 5°C	Desertification of many world regions with widespread loss of forest and grassland
	Potential to trigger melting of West Antarctic Ice Sheet, raising sea levels by a further 5 – 6 m for centuries or up to 75cm by 2100
	Chance of complete collapse of Thermohaline circulation, cooling Northern Hemisphere by several degrees and changing rainfall patterns
	Potential release of methane from melting tundra and shallow seas, further accelerating warming

Source: Stern Review (2007) based on Schneider and Lane (2006)

Athanasiou (2007) introduces a useful summary of probabilities of exceeding 2°C warming for different pathways for reducing emissions based on Baer and Mastrandrea (2006). Three pathways are identified with different probabilities of exceeding two degrees of warming. These are:

1. Peaking emissions by 2010 before falling by 5% a year to stabilise at 410ppm. Probability of exceeding two degrees: 9-26%
2. Peaking emissions by 2020 before falling steadily to stabilise at 450ppm. Probability of exceeding two degrees: 45-86%
3. Peaking emissions by 2030 before falling steadily to stabilise at 550ppm. Probability of exceeding two degrees: 78-99%

Based on these figures, the fact that current carbon dioxide concentrations are already around the 380ppm level is obviously considerable cause for concern.

Since the Stern Review was released, the IPPC has released its fourth assessment report, which presents new evidence on the equilibrium concentration level of CO_2 and CO_2 equivalent that would need to be achieved in order to avoid exceeding a 2^oC increase in global average surface temperature. This evidence suggests that equilibrium temperatures need to stabilise between 350-400ppm CO_2 or 445-490 CO_2 equivalent in order to achieve warming of between 2-2.5^oC (IPCC 2007d: 23). This implies that stabilisation at 2^oC above pre-industrial levels is most likely to be achieved if CO_2 concentrations are stabilised at the lower end of this range, in other words at 350ppm CO_2 or 445 CO_2 equivalent. What is more, the evidence presented by the IPCC suggests that, in order to achieve this stabilisation level, CO_2 emissions would have to peak between 2000-2015. This implies that there is a maximum of just over seven years remaining before the rising trend in global CO_2 emissions must be reversed. The range of possible concentrations and associated temperature rises, together with the range in the time periods when emissions need to peak, are due to the uncertainty inherent in climate models as discussed above.

2.2.6. Policy Response

It is clear from the analysis above that policy action to combat climate change needs to be tackled as a matter of urgency. In many ways this presents an unprecedented challenge to policy makers requiring radical action across a broad spectrum of policy areas. It also requires governments to act to educate and encourage individuals and businesses to change their own behaviour to minimise their emissions of greenhouse gases. The task is primarily to begin to reduce global emissions as soon as possible. This clearly represents a huge discontinuity with previous trends in greenhouse gas emissions, which have increased exponentially since the industrial revolution and continue to increase. With countries like China and India on the verge of unprecedented future economic growth, reducing global greenhouse emissions presents even more of a challenge. This highlights the enormity of the challenge governments face if they are to be successful in responding to climate change.

The policy responses required to tackle climate change span a broad range of areas. All these areas are also beset by a huge degree of complexity related to interactions with other policy areas as well as complex barriers to implementation and inbuilt inertia within various systems such as existing electricity supply systems housing stock. It is, nevertheless, possible to identify key areas where government policy needs to focus if even the least ambitious emissions reductions targets are to be achieved in the UK. Key aspects of the UK's strategy for tackling climate change at the domestic level are discussed in detail in Chapter 3. Five important areas that require concerted commitment and action at the international level are:

International Engagement

Tackling climate change requires international action. The UK, both unilaterally and within the context of its place within the EU and other multilateral commitments such as the UNFCCC, must continue to engage in international climate negotiations. The UK's international role also needs to engage with developing countries to help to reduce future emissions from these economies. This involvement includes work to accelerate the

transfer of low carbon technologies to developing countries (see, for example, Ockwell et al. 2006).

Legally Binding Emissions Targets
A critical policy area that must be addressed under international initiatives to combat climate change is a commitment to a legally binding emissions reduction target. This target must be based on the figures supported by the most up to date science. International commitment to an ambitious post 2012 agreement to follow on from Kyoto is central to achieving this aim.

Trade
The majority of countries, and industrialised countries in particular, cannot ignore the fact that a significant amount of their consumption is of imported goods and services. This fact implies that countries such as the UK are responsible for the demand that drives carbon emissions from production of these goods and services in other parts of the world. On this basis, the UK's contribution to global carbon emissions, for example, is likely to be much higher than the 0.2% widely cited. Policy action is therefore required to reduce the carbon intensity of trade.

Deforestation
Curbing current rates of deforestation is one of the most cost effective ways of combating current carbon emissions (Stern 2007: 245). Engagement with countries where deforestation is an issue is therefore an important policy priority. Counties such as the UK must also maintain an active commitment to international treaties such as the Convention of Biological Diversity and international certification schemes such as that of the Forest Stewardship Council that aim to reduce the impacts of trade on deforestation. Any efforts directed towards reforestation or initiatives that aim to buy and protect areas of forest in other countries in order to offset domestic emissions must, however, ensure that they do not result in the planting of biodiversity-poor monocultures and that they do not negatively impact on the rights of indigenous populations.

Adaptation
Certain levels of climate change are now inevitable no matter what action is taken to reduce emissions due to the inertia of greenhouse gases in the atmosphere. All countries, including the UK, therefore need to assess and implement sufficient measures to enable vulnerable areas to adapt to future climate change. This is particularly important in many developing countries where the impacts of climate change on people's livelihoods and wellbeing are likely to be most severe, despite the negligible contributions of these affected individuals to global carbon emissions. Support from industrialised nations, both in terms of finance and technological assistance will be integral in assisting many developing nations to mitigate and adapt to future impacts of climate change.

2.3. Biodiversity

Human activity is having a profound and often irreversible impact on biodiversity. Biodiversity can be simply defined as the diversity of life on Earth. This section reviews the basic scientific principles behind the need to conserve biodiversity and the potential implications of failing to do so.

2.3.1. Why is Biodiversity Important?

The complex web of life, or biodiversity, that exists on Earth today, and of which human beings are an intricate part, is the result of millions of years of evolution. Biodiversity refers both to differences between species of plants, animals, fungi and micro-organisms and to genetic differences within each species. At a more macro level, biodiversity can also be thought of in terms of the variety of different ecosystems and habitats that make up the Earth, such as deserts, forests, wetlands, grasslands, lakes, rivers, oceans and agricultural landscapes (CBD 2005: 3).

As highlighted by the Millennium Ecosystem Assessment[3] (MA 2005a: 3), there are two main concepts that are important to grasp in order to avoid confusion with regard to the science behind biodiversity and its policy implications. The first is the difference between the value of the *diversity* of genes, species, or ecosystems per se and the value of any *single component* of that diversity, such as a single species. Diversity is valuable in and of itself for a number of reasons, such as increasing the resilience of ecosystems to natural or man-made shocks (the value of biodiversity in terms of ecosystem functioning is explored below). At the same time, however, individual components of that diversity may be valuable in their own right, for example a particular species of plant or animal might be valuable as a source of food or medicine, or a particular genetic strain of an arable crop might be resistant to certain diseases now or in the future.

The second important conceptual issue concerns the specific level of biological organisation and/or geographic scale that is being considered. Different levels of biological organisation include genes, populations, species and ecosystems. Different geographic scales span local and regional through to global. It is important to specify the level of organisation and scale that is being considered when dealing with biodiversity related issues. The Millennium Ecosystem Assessment (MA 2005a: 3) gives the example of the widespread introduction of a new weed species to Africa. This would increase species diversity in Africa (more species present) whilst decreasing ecosystem diversity globally (the species composition of ecosystems in Africa become similar to those elsewhere in the world). These distinctions between multiple levels of biological organisation and geographic scale can mean that any single indicator, e.g. species number, is a poor indicator of many other aspects of biodiversity that may be of policy concern.

[3] The Millenium Ecosystem Assessment emerged from decisions taken by the Convention on Biological Diversity (see next footnote). It was convened under the auspices of the UN and aimed to *'to assess the consequences of ecosystem change for human well-being and to establish the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contributions to human well-being'* (MA 2005a: ii).

Biodiversity loss thus needs to be considered in light of the two conceptual issues highlighted above. And it is these issues that underpin the definition of biodiversity loss adopted by the Convention on Biological Diversity[4] (CBD Decision VII/30):

> *'[Biodiversity loss is] the long term or permanent qualitative or quantitative reduction in components of biodiversity and their potential to provide goods and services, to be measured at global, regional and national levels'.*

A final conceptual issue that is worth highlighting in relation to biodiversity loss is the fact that biodiversity can be reduced in two different ways. The first, more obvious way is through the removal of a species from an ecosystem. The second, less obvious way is by the introduction of a new species to an ecosystem. This may, as outlined above, result in reduced diversity at the ecosystem level. But, at the same time, if this introduced species out-competes existing species within that ecosystem and therefore becomes dominant, it will have a negative impact on the abundance of existing species. This change in the balance of an ecosystem from one where several species were abundant to one where a single species dominates whilst others become rare can be interpreted as a loss of biodiversity, despite the fact that the overall number of species within that ecosystem has increased. Biodiversity is therefore measured by ecologists using different mathematical indices which account more for either rarity or relative abundance.

2.3.2. Biodiversity and Ecosystem Functioning

The healthy functioning of different ecosystems relies on the complex interactions between an intricate array of different species of plants, animals, fungi and micro-organisms that exist within each ecosystem. Human beings rely on healthy ecosystem functioning for the provision of essential goods and services. Goods include resources such as water, food and raw materials. Services include the provision of sinks for the by-products of human activities (e.g. absorption of agricultural and industrial pollutants by rivers and lakes), nutrient recycling and the regulation and maintenance of the climate which makes life on Earth possible.

As the Subsidiary Body on Scientific, Technical and Technological Advice to the Convention on Biological Diversity puts it (CBD 2005: 3):

> *'It is the combination of life forms and their interactions with one another and with the physical environment that has made Earth a habitable place for humans. Ecosystems directly or indirectly provide the basic materials necessary for life (e.g., food, water), offer protection from natural disasters and disease (e.g., regulating climate, floods and pests), and underpin important aspects of human culture (e.g., spiritual needs, knowledge systems and traditional use). Ecosystem services also maintain the essential life processes of the planet, such as primary production and nutrient recycling. These supporting services are provided at all*

[4] The Convention on Biological Diversity emerged from the 1992 Rio Earth Summit. It has been signed by 150 governments and includes a series of commitments to work towards preserving biodiversity. For more information see http://www.biodiv.org/default.shtml

levels – local, regional and global –and every one makes crucial contributions to human well-being. Biodiversity is essential for the sustained provision of these ecosystem goods and services'.

There are two main ecological characteristics that tend to be associated with ecosystem health: stability and productivity. Ecosystem stability can be measured in a number of ways, but the two most common measurements are resistance and resilience. Resistance refers to an ecosystem's ability to resist perturbations[5] (i.e. to withstand them). Resilience refers to an ecosystem's ability to return to its original equilibrium state following a perturbation (i.e. to recover from it). Productivity refers to the level of primary production i.e. the conversion of nutrients, light and energy into biomass. Primary production is the basis of all ecosystems. It forms the first level of the trophic triangle and is therefore the fundamental building block that enables other life forms to exist. From a human perspective, productivity is fundamental to the provision of essential goods such as food or wood (Balvanera et al. 2006).

Based on decade long observations of prairie grassland plots, Tilman et al. (1996) demonstrated that greater species diversity was also positively correlated with higher productivity. This finding is supported by the majority of analyses that have been done of the diversity-productivity relationship (Balvanera et al. 2006). The rationale put forward to explain this is that inter-specific differences between different species allows more diverse communities to more fully utilise limiting resources such as nutrients and sunlight. As biodiversity is lost, ecosystems become more open, interrupting the tight internal cycling of nutrients. This results in the ecosystem losing the nutrient capital upon which productivity is based. As well as this positive relationship between diversity and primary productivity, increased diversity amongst plants has also been shown to result in greater diversity amongst primary consumers. It has also been observed to have positive impacts on a range of other ecosystem services including decreased soil erosion, reduced pest damage, and reduced risk of invasion by pests (Balvanera et al. 2006).

Once again based on analysis of controlled plots of prairie grasses, Tilman and Downing (1994) also famously demonstrated that higher levels of biodiversity are positively correlated with greater ecosystem resilience and resistance to drought. However, whilst Tilman at al.'s work clearly demonstrated a positive correlation between diversity and ecosystem stability, it cannot prove a causal relationship between the two. The work also ignores the possible role of functional diversity, which refers to the diversity of different functions performed by different organisms within an ecosystem, such as the different function carried out by grasses, nitrogen-fixing legumes and other herbs (McCann 2000). Other studies have shown that stability is not just related to species diversity but also to functional diversity (Hooper and Vitousek 1997; Huston 1997; Tilman et al. 1997; Wardle et al. 1999; McCann 2000). A study carried out in the Serengeti demonstrated that, whilst five out of seven different measures of stability correlated positively with diversity, functional diversity played a key role in preventing grazing pressures from dramatically reducing plant biomass (McNaughton 1985).

[5] Perturbations can occur naturally such as drought or flooding or they can occur as a result of human activities, such as deliberate burning or harvesting plants or animals.

Despite these complicated potential interactions between species diversity and functional diversity, the existence of a positive correlation between ecosystem stability and species number has been supported by a number of microcosm experiments, which seek to recreate natural ecosystems under controlled conditions (Morin and Lawler 1995; McGradySteed et al. 1997; Naeem and Li 1997; Naeem 1998; McCann 2000; McGrady-Steed and Morin 2000). The basic reasoning behind these observations and the more general assertion that ecosystem stability will decrease with decreasing diversity rests on two ideas that are collectively known as 'the insurance hypothesis' (McCann 2000). The first is that there is more chance that different species will respond differently to perturbations if more species are present in an ecosystem. The second is that there is more chance in more diverse ecosystems that some species will be functionally redundant but able to step in and take over the functioning of other functionally important species if these important species are affected by a perturbation. In other words, whilst species differ in their traits, in species rich ecosystems other species are more likely to be functionally similar to existing species. More diverse ecosystems are therefore more likely to contain some species that can compensate for the ecosystem functions that were once undertaken by their competitor species whose abundance is reduced during a disturbance. So, as one species reduces in number, other species are available to step in and take over their jobs within that ecosystem. The ecosystem is therefore more likely to be able to continue to function as before.

Another approach to understanding the diversity-stability relationship involves the use of food-web based experiments that study the strength of interaction between different species. These studies have shown that, where interaction strengths are strong, as is often the case in less diverse ecosystems, even the removal of one single species can have catastrophic impacts on the ecosystem (McCann 2000).

Many examples exist of situations where external pressure on an ecosystem results in abrupt, non-linear impacts on the whole ecosystem. Such occurrences are known as 'threshold effects'. Threshold effects usually result from the removal or addition of a single species. They can also occur from external environmental pressures such as nutrient loading as a result of fertiliser run-off from agricultural land. For example, over fishing of herbivorous fish species around coral reefs and fertiliser run-off from coastal agriculture has resulted in a major ecosystem shift to algal-dominated ecosystems on several coral reefs, including areas of the Great Barrier Reef. Another example of a threshold effect is the introduction of an invasive, carnivorous species of ctenophore (*Mnemiopsis Leidyi*, a jellyfish-like animal) to the Black Sea which resulted in the rapid loss of 26 major species of fish (MA 2005a: 6). These threshold effects highlight the uncertainty that exists regarding the possible effect of human activities on the many ecosystem goods and services upon which our livelihoods rely.

Overall, the vast majority of scientific evidence points to a positive relationship between biodiversity, ecosystem stability and the provision of important ecosystem goods and services (Balvanera et al. 2006). Furthermore, as ecosystems become less biodiverse, the chances of catastrophic ecosystem impacts resulting from the loss of a single species is

dramatically increased. As McCann (2000) highlights, the policy implications of these observations are fairly straight forward:

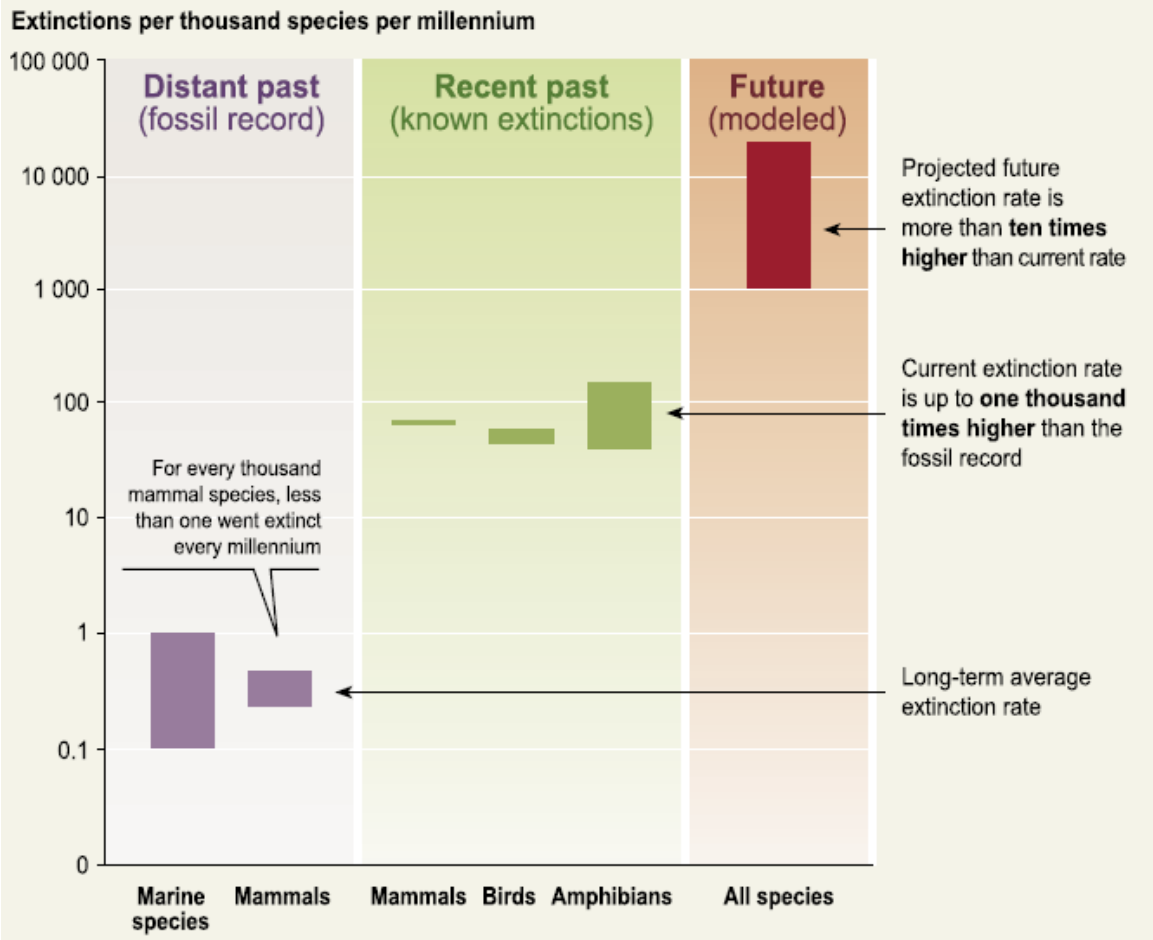
1. To preserve an ecosystem and its component species each species needs to be treated as potentially integral to ecosystem functioning and therefore irreplaceable
2. Species removals (extinction) or species additions (invasions) can, and eventually will, result in major, and potentially catastrophic, shifts in ecosystem dynamics

Human beings are economically, socially and, ultimately, biologically completely reliant on healthy ecosystem functioning. These findings therefore imply that the loss of biodiversity has potentially catastrophic implications for human wellbeing and, ultimately, human survival.

2.3.3. Current Rates of Biodiversity Loss

Concern has long been raised that current rates of loss of the world's flora and fauna are far in excess of those observed during the mass extinction events that punctuate the fossil record (Reid 1997; McCann 2000). The Millennium Ecosystem Assessment (MA 2005a, 2005b) reported that current rates of species extinction are in fact one thousand times higher than anything that the fossil record implies has ever occurred before (Figure 2.12). Increasing globalisation has also resulted in unprecedented levels of species invasions into areas where they did not originally exist which, as highlighted above, also contributes to biodiversity loss (Lodge 1993; McCann 2000).

Figure 2.12: Species Extinction Rates



Source: MA (2005a: 44)

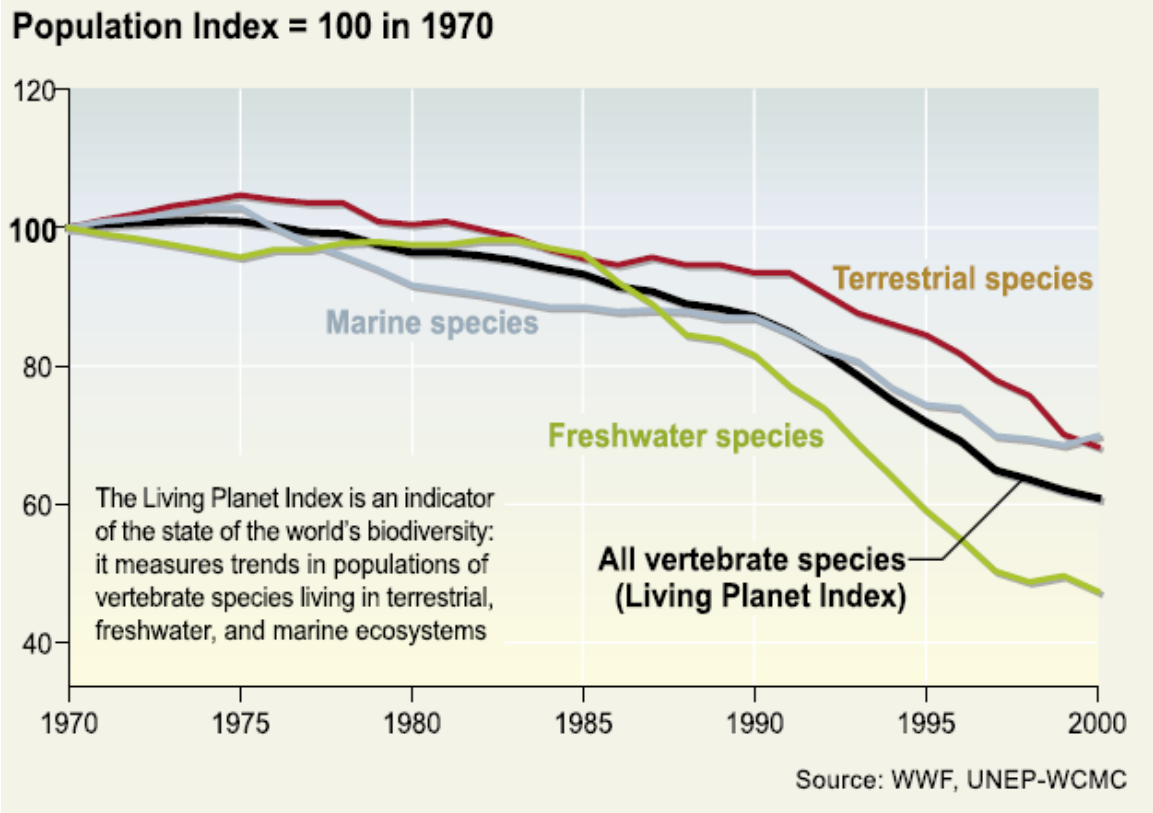
The rate of change in essential components of biodiversity was more rapid in the last 50 years than at any other time in human history (MA 2005a: 2). Almost all of the Earth's ecosystems have now been dramatically transformed by human actions. For example the MA reports the following statistics based on global estimates (MA 2005a: 2):

- Conversion of forested land to cropland with more land having been converted in the 30 years after 1950 than in the 150 years between 1700 and 1850.
- Increased storage of water rather than allowing this water to disperse into the ecosystems it would originally have supplied. This includes increasing reservoir storage by four times the 1960 capacity by 2000 and six times the amount of water flowing through rivers at any one time currently being stored behind dams.
- 35% of mangrove forests have been destroyed in the last two decades (these are essential to coastal ecosystems, including fish stocks, and to the protection of inland areas from flooding).
- 20% of known coral reefs have been destroyed and a further 20% degraded in the last few decades.

Overall, almost half the 14 biomes[6] assessed by the Millennium Ecosystem Assessment (MA 2005b, 2005a) were observed to have experienced a 20-50% conversion due to human use. The most heavily affected biomes were temperate and Mediterranean forests and temperate grasslands where almost 75% had been converted to cultivated land. Rates of conversion have, however, been highest in tropical and sub-tropical dry forests during the last 50 years.

Between 10% and 50% of higher taxonomic groups, which include mammals, birds, amphibians, conifers and cycads, are currently threatened with extinction according to IUCN-World Conservation Union criteria. This includes 12% of bird species, 23% of mammals, 25% of conifers, 32% of amphibians and 52% of cycads (MA 2005a: 4). These trends are illustrated in Figures 1.13 and 1.14 below. The figures quoted here, however, mask the fact that fresh and salt water organisms have not been studied to nearly the same degree as terrestrial species implying that extinction rates could be much higher than the figures suggest. A marked decline has also been observed in genetic diversity in the last few decades, particularly amongst domesticated species of plant and animals (MA 2005a: 5). This is mainly a result of intensification of agricultural systems and specialisation by plant breeders within a now globalised industry.

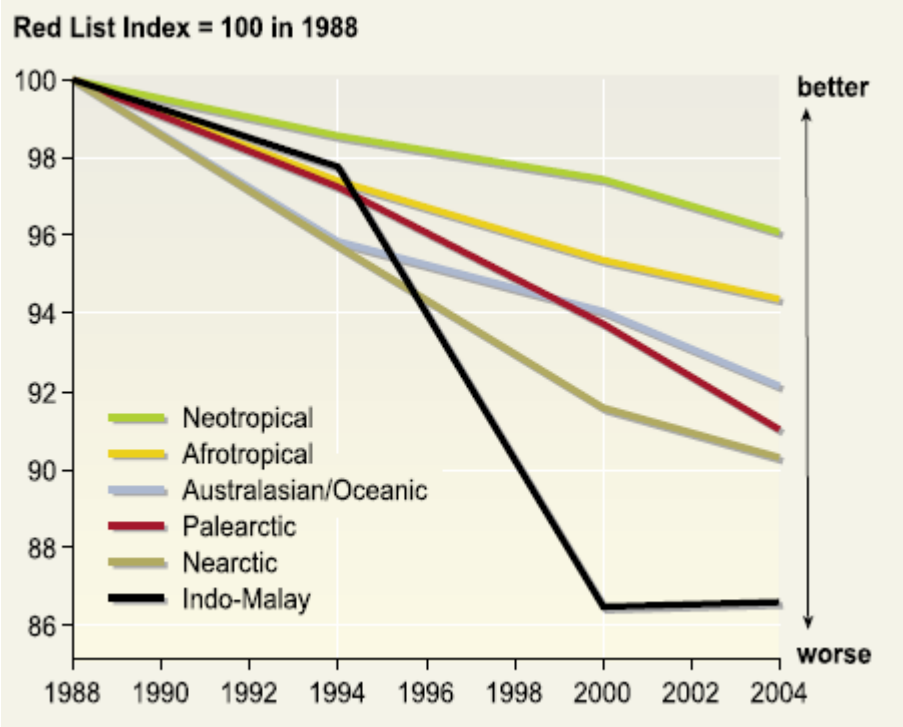
Figure 2.13: The Living Planet Index 1970-2000



Source: MA (2005a: 47)

[6] Biomes represent broad habitat and vegetation types that span biogeographic regions and enable the classification of areas of the globe into ecologically meaningful and contrasting classes that are useful for assessing global biodiversity and ecosystem services.

Figure 2.14: Red List Indices for Birds 1988-2004 in Different Biogeographic Realms



Source: MA (2005a: 44)

The Millennium Ecosystem Assessment (MA 2005a: 5) estimates that a further 10-20% of existing grassland and forestland will be converted to other uses by 2050. This is likely to be accompanied by a reduction of 10-15% in the number of plant species, although this may well be an underestimate as it doesn't consider species loss due to other perturbations such as climate change, pollution and modification of water flows. High rates of extinction and invasion across the globe, together with decreasing levels of genetic diversity, are leading to ecosystems becoming more homogenous (MA 2005a: 4) thus increasing the risk of catastrophic ecosystem effects as outlined above.

2.3.4. Drivers of Biodiversity Loss

The main causes of biodiversity loss are habitat change (e.g. conversion to agriculture, urbanisation, modification of, and water extraction from, rivers, destruction of coral reefs, damage to sea floors due to trawling, desertification), climate change, invasive alien species, overexploitation of species (e.g. over fishing) and pollution (in particular nitrates and phosphorus and sulphur from agriculture and industrial processes). The impact of these different drivers of biodiversity over the last century and the current trend in the impact of these drivers (increasing, decreasing or constant) is illustrated in Figure 2.15 further below.

Climate Change

Climate change, in particular, has the potential to have extreme negative future impacts on biodiversity. There is little dispute that climates are changing across the globe, and the nature of these changes is projected to continue even if the most extreme abatement

scenarios are implemented (IPCC 2007). The primary agent of habitat change over the past few hundred years has been direct human activity. There is, however, little doubt that future climate change will impact far more significantly than previous observed climatic changes on forest composition and distribution. Many commentators predict that climate change could become the dominant driver of biodiversity loss and ecosystem change by the end of this century.

Recent climatic changes, as detailed in section one of this chapter, have already had significant impacts on biodiversity. This includes driving changes in population sizes, distributions of species, the timing of reproduction and migration and increased frequency of disease and pest outbreaks. Many coral reefs have also undergone sometimes irreversible bleaching as a result of increasing sea temperatures. The key ecosystem and biodiversity impacts of climate change are summarised by the Millennium Ecosystem Assessment (MA 2005a: 10) as:

- Increasing the risk of extinction for many species, especially those already at risk due to factors such as low population numbers, restricted or patchy habitats, and limited climatic ranges
- Decreasing water availability and quality in many arid and semiarid regions
- Increasing risk of floods and droughts
- Decreasing reliability of hydropower and biomass energy production
- Increasing incidence of vector-borne diseases such as malaria and dengue and of waterborne diseases such as cholera as well as increasing incidence of heat stress mortality and threats of decreased nutrition in other regions, along with severe weather traumatic injury and death
- Decreasing agricultural productivity in the tropics and sub-tropics for almost any amount of warming and projected adverse effects on fisheries
- The unprecedented (over the last 10,000 years) projected changes in climate during the twenty-first century, combined with land use change and the spread of exotic or alien species, are likely to limit both the capability of species to migrate and the ability of species to persist in fragmented habitats

To put the potential future impact of climate change in some context, it is worth considering the following.[7] Future climatic change is likely to be different from the past events discussed in Section 1 of this chapter for three main reasons. Firstly, the rate and direction of predicted climatic change exceeds that of past climatic change, second, the character of future climates with high CO_2 and high temperature are unprecedented in the recent geological past and, thirdly, many natural habitats have become fragmented by human populations, producing isolated habitat islands that are unable to migrate in order to respond to changes in local climate or habitat.

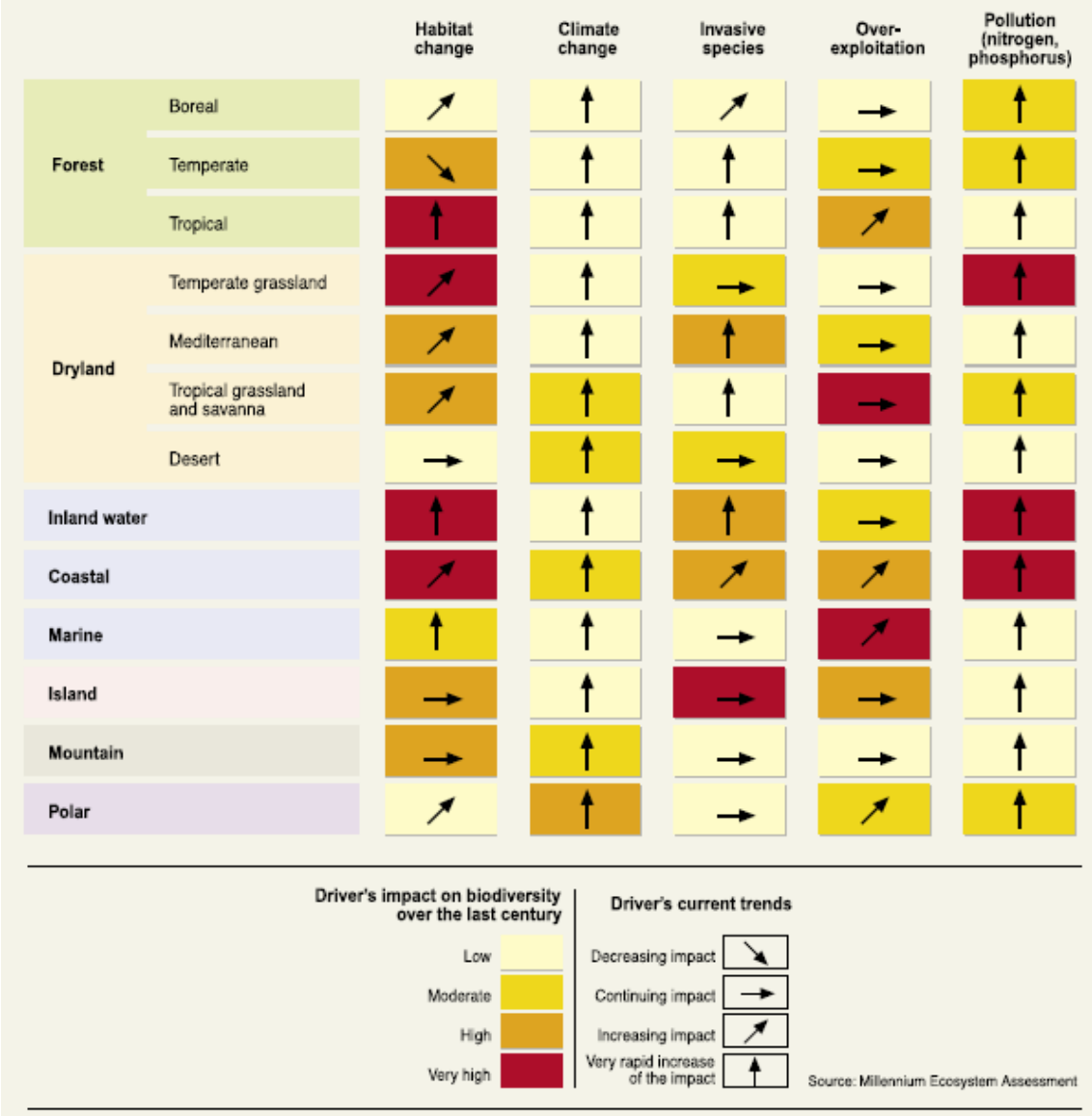
Consider, furthermore that over the last 2 million years (the Pleistocene) there have been approximately 21 major fluctuations in temperature, precipitation, atmospheric

[7] The remaining part of this sub-section on the impacts of climate change on biodiversity ecosystem functioning draws directly on a review of this chapter conducted by Dr Rob Marchant, Environment Department, University of York in April 2007.

composition and hydrology as glacial periods have waxed and waned. For most of this time (some 80-90%), the climate was 'glacial', so that ecosystems and associated biodiversity have mostly existed under low temperature, CO_2, and reduced rainfall. Ecosystems have therefore been able to 'jump' across the warm interglacial periods before being more comfortable within the glacial environment. Thus, the current trend of warming within an interglacial warm period is unprecedented, particularly in the context of the ability of species and ecosystems to migrate and adjust their ranges, a process that has been severely curtailed by human-transformed landscapes and the resulting habitat islands mentioned above.

A recent model of the change in patterns of African plant diversity showed a massive loss of suitable climate for forest species in the area currently occupied by tropical forest in west and central Africa. If the model is correct, then global warming will bring significant changes in forest distribution. But, massive changes occurred to Afromontane forests following climate shifts in previous glacial periods, so why should we be concerned over future climate change and associated ecosystem response? An unprecedented factor of the current situation is the high and increasing level of atmospheric CO_2, which is having a direct impact on many drought-stressed ecosystems such as the extensive tropical savannah biome. Elevated CO_2 is thought to be responsible for increased growth in woody species, not through any mechanism of direct fertilisation, but by reducing the relative water stress. Plants have stomata open for less time to exchange gases for growth and respiration resulting in less water loss and this increases growth. The implications of elevated levels of CO_2 in terms of increased biomass and associated changes on forest structure and composition are therefore only just beginning to be realised but will certainly have a massive impact. For example, whereas some models will show die-back of Amazonia as a result of climate change (drying), when CO_2 and increased water use efficiency of tropical trees is factored in this results in expansion of tropical moist forest into areas that would only previously support dry forest types.

Figure 2.15: Current and Future Global Impact of Direct Drivers of Biodiversity Loss



Source: MA (2005a)

Indirect Drivers

Indirect drivers of biodiversity loss are also very important for policy makers to understand. The Millennium Ecosystem Assessment (MA 2005a: 8) breaks these down into five categories: demographic, economic, sociopolitical, cultural and religious. These man-made drivers dominate current causes of biodiversity loss. In particular, growing consumption of ecosystem services and increasing use of fossil fuels resulting from rapidly expanding populations and per capita consumption is exerting ever more pressure on biodiversity. This is set to worsen over coming years as the trend in economic growth that witnessed a seven fold increase in GDP observed between 1950 and 2000 continues. Sociopolitical drivers refer to the nature of governance in different countries and how this facilitates or hampers effective conservation efforts. Cultural and religious issues are

integral to people's perception of nature and hence their interactions with and impacts upon it.

Key UK Biodiversity Issues

In the UK, the main drivers of biodiversity loss over recent decades have been agricultural intensification, built development, including houses and roads, industry and minerals extraction and commercial forestry (HM Government 1994a. This implies action is required across several key sectors, including road transport, agriculture, forestry, energy, minerals and fishing. The protection and sustainable management of the UK's different types of protected areas, national parks and coastlines also has a key role to play in the conservation of biodiversity. Action to preserve biodiversity in the UK therefore involves a wide range of actors across the public, private and not-for-profit sectors as well as civil society.

2.3.5. Policy Responses

The broad range of different drivers of biodiversity loss is reflected in an equally broad range of areas where effective policy action is required. The Millennium Ecosystem Assessment (MA 2005a: 10-14) divides the actions that need to be taken to attempt to conserve biodiversity into two categories. The first necessary, but not sufficient, category of actions involves direct conservation activities and attempts to encourage sustainable use of natural resources. The second category involves attempts to address the underlying causes of biodiversity loss.

Category 1: Direct Conservation and Sustainable Use of Natural Resources

Conservation oriented actions include:

Protected areas

A range of actions are required in relation to protected areas. These include:

- Ensure sustainable management of existing protected areas using an ecosystem oriented management approach.
- Improve the location, extent and management of protected areas to deal with issues such as lack of representativeness, impacts of human settlement within protected areas, illegal harvesting of plants and animals, unsustainable tourism, impacts of invasive species, and vulnerability to global change. This should include a switch from static protected area management to dynamic management systems that account for climate-induced migration of species.
- Marine and freshwater ecosystems are even less well protected than terrestrial ones. There is significant potential to capitalise on win-win benefits from marine protected areas that both conserve ecosystems at the same time as increasing fishing catch in surrounding areas.

Species protection and recovery measures for threatened species

As well as habitat-based conservation, considerable effort must also be made to focus on species-based conservation to ensure that species are protected from extinction.

Ex situ and in situ conservation of genetic diversity
It is important to ensure that an adequate range of genetic diversity is conserved in ex situ facilities. This should be used to complement in situ conservation efforts. Ensuring that ex situ genetic resources remain in the public realm can ensure their availability to service the needs of, for example, poor farmers or populations facing extreme conditions such as pests or drought. These genetic resources may also be of value to future generations.

Ecosystem restoration
Action can be taken to restore many ecosystems including forests, wetlands, grasslands, estuaries, coral reefs and mangrove forests. Whilst restoration may increasingly be necessary as ecosystems continue to be degraded and demand for their services increases, it is a far more costly option than protecting the original ecosystem. It is also rare to be able to restore the full extent of the original biodiversity and ecosystem services.

Actions oriented to ensuring sustainable use of natural resources include:

Direct payments and markets for biodiversity and ecosystem services
Market incentives to conserve biodiversity have had some success in certain areas. This includes, for example, creating income from eco-tourism, tax incentives for sustainable land uses, tradable development permit programmes that limit the total level of development and contractual arrangements such as between upstream landowners and those benefiting from downstream watershed services. Markets for carbon provide another market based example that has the potential to provide financial incentives for preserving forests. The impact of carbon markets on biodiversity is, however, contentious as it could lead to the planting of non-native, single species stands of fast growing trees that could have a detrimental impact biodiversity. Market based approaches also have many other draw backs such as the difficulty of ensuring access to adequate information for buyers and sellers, creating the right kind of institutional framework, overcoming transaction costs and ensuring an equitable distribution of benefits.

Incorporating biodiversity and conservation considerations into general management practices
Sectors such as agriculture, forestry, and fishing could significantly reduce their impact on biodiversity by explicitly integrating conservation considerations into their management approaches. This could also entail benefits for the sectors themselves. For example, integrated pest management on farms can increase biodiversity at the same time as decreasing the financial cost to the farmer of pest management associated with pesticides. It also opens up opportunities within the rapidly expanding market for organic food.

Enabling local communities to capture the benefits of biodiversity conservation
Attempts to enable local communities to capture benefits from biodiversity conservation, such as the sale of products from single species or eco-tourism, have achieved mixed success. This is largely due to the fact that greater incentives often exist to pursue actions that result in biodiversity loss, such as conversion of land to agriculture. Successful

examples are usually based around the implementation of strong institutional structures that conform to the culture and traditions of, and are developed through the direct involvement of the local communities in question. This includes clearly delineated rights to the resource and appropriate mechanisms in place to impose sanctions for non-conformity.

Actions that seek to address conservation and sustainable use include:

Increased coordination among multilateral environmental agreements and between environmental agreements and other international economic and social institutions
Whilst international agreements are vital to biodiversity conservation, the focussed nature of their goals and interventions do not reflect the complex, inter-linked nature of ecosystem services. Increased integration between multilateral environmental treaties and international treaties such as trade agreements is a necessary step for ensuring effective action to prevent biodiversity loss.

Public awareness, communication, and education
Education and communication has played an essential role in improving awareness and attitudes towards biodiversity conservation. Ensuring the provision of sufficient human and financial resources for education is a constantly limiting factor in enabling education and communication around the need for biodiversity conservation.

Enhancement of human and institutional capacity for assessing the consequences of ecosystem change for human well-being and acting on such assessments
Improved technical and institutional capacity need to be developed to enable natural resource users to develop sustainable management approaches in industries such as agriculture, forestry and fisheries. This includes developing approaches for understanding and enhancing ecosystem services from activities that are not directly related to the primary natural resource being exploited. One example would be instituting forestry management techniques that enhance watershed maintenance functions of an area of forest at the same time as providing a sustainable supply of timber.

Increased integration of sectoral responses and responsibilities
Industries with a direct impact on biodiversity management, such as forestry, agriculture and fisheries, are often the responsibility of different government agencies. Adopting a combined, integrated strategy for tackling biodiversity loss across different agencies could increase the overall effectiveness of policy actions.

Category 2: Addressing Underlying Causes of Biodiversity Loss

The policy actions described above are unlikely to meet sustained success unless the underlying causes of biodiversity loss are also properly addressed. These actions need to create the enabling conditions that will both ensure the effectiveness of biodiversity policies and determine the extent to which policies will be implemented. These actions include:

Elimination of subsidies that promote excessive use of ecosystem services (and, where possible, transfer these subsidies to payments for non-marketed ecosystem services)

An astounding amount of money is paid in subsidies to farmers and fishermen in developed nations. A large amount of these subsidies, particularly in agriculture, is paid for unnecessary over production. Subsidies also have an adverse impact on the profitability of the industries in developing nations. They also provide financial incentives for unsustainable management practices such as excessive use of fertilisers and pesticides. The MA cites subsidies paid to the agriculture sector in OECD countries between 2001 and 2003 as being $324 billion, or one third the value of global agricultural value in 2000 (MA 2005a, p.12). In the fisheries sector in 2002 subsidies in OECD countries amounted to $6.2 billion, or 20% of the gross value of production.

Whilst the removal of such subsidies is desirable, they will result in negative impacts on certain actors who may rely on agricultural or fisheries subsidies for their livelihoods. Care must also be taken as the removal of subsidies in developed nations will make the relative cost of production in developing nations lower. This could result in increased pressure for intensified agriculture or fishing activities in developing nations.

Sustainable intensification of agriculture

Agricultural expansion will continue to represent a major driver of biodiversity loss in many countries well into the future. The development, assessment and diffusion of technologies that can increase production per unit area without harmful side effects such as excessive water consumption or increased use of fertilisers and pesticides, will play a key role in reducing the impact of agriculture on biodiversity. Actions in this area must include efforts to understand how to facilitate the transfer of existing technologies to appropriate areas of need. The overall aim should be to enable sustainable agricultural production with increased yields that, at the same time, ensure the conservation of biodiversity and other ecosystem services such as pest control, soil fertility and water shed management.

Slowing and adapting to climate change

Climate change represents one of the greatest threats to biodiversity. Effective action to reduce greenhouse gas emissions are therefore an essential part of tackling biodiversity loss. The level of inertia in the climate system also implies that adaptation activities, such as creating wildlife corridors between different habitat areas, will also be necessary.

Addressing unsustainable consumption patterns

Consumption patterns have a direct impact on biodiversity and ecosystem services such as through the consumption of non-renewable resources, demand for rare or endangered species, or simply excessive demand for food or other natural resources. Action to change consumption patterns involves a range of actions to address issues such as per capita consumption, trade, population growth and intensity and the efficiency of resource use.

Slowing the global growth in nutrient loading
Policies are required to encourage the diffusion of existing technologies that can reduce the level of fertiliser run-off from agriculture.

Correction of market failures and internalisation of environmental externalities that lead to the degradation of ecosystem services
The costs to the environment in terms of biodiversity loss or ecosystem services are often not reflected in the market price of the commodity that resulted in these environmental costs. For example, farming in the UK might result in fertilisers running off into rivers. This imposes costs such as impacts on aquatic plant and animal life. It can also impose costs on human health such the famous cases of blue baby syndrome caused by excessive nitrogen in the water supply from agricultural runoff. Market based instruments exist that can be used to reflect the environmental costs of different activities in the price of producing and selling products. As well as creating markets for ecosystem services as mentioned above, market based instruments include taxes on environmentally harmful activities, cap and trade schemes, such as the trade of permits to produce certain pollutants, and certification schemes that enable consumer preferences to be reflected in purchasing decisions, such as the certification of timber from sustainable forestry.

Integration of biodiversity conservation and development planning
Actions to conserve biodiversity are likely to be more effective if they are integrated into national development and poverty reduction strategies. Development plans and poverty reduction strategies will also be more effective in the long term if they properly attend to the need to conserve biodiversity and ecosystem services which many of the world's poorest people are directly reliant on for their livelihoods.

Increased transparency and accountability of government and private-sector performance in decisions that affect ecosystems, including through greater involvement of concerned stakeholders in decision-making
The involvement of relevant stakeholders in decision-making processes has a range of benefits that will, directly or indirectly, contribute to increasing the effectiveness of biodiversity conservation. It can contribute local and lay knowledge of ecosystem functioning and relevant socio-economic factors that are vital to developing effective policy. It can also increase trust in government institutions thus increasing the likelihood of people acting to uphold policies geared towards biodiversity conservation. Stakeholder involvement also increases the transparency of decision making and can play an important role in reducing corruption.

Scientific findings and data need to be made available to all of society
The availability of and ability readily to access data relating to a region's biodiversity is a major barrier to understanding, valuing and developing effective policy responses to tackle biodiversity. The development and maintenance of databases detailing an area's biodiversity is therefore a vital part of facilitating biodiversity conservation. Examples include CONABIO initiative in Mexico and the Worldmap initiative financed by Conservation International[8].

[8] See http://www.york.ac.uk/res/celp/webpages/projects/worldmap/worldmap.htm

Finally, developing a framework that integrates an ecosystem-based approach into all management and planning decisions that affect land, water and living resources is vital to achieving long term preservation of biodiversity and associated ecosystem services.

> *'Application of the ecosystem approach involves a focus on the functional relationships and processes within ecosystems, attention to the distribution of benefits that flow from ecosystem services, the use of adaptive management practices, the need to carry out management actions at multiple scales, and intersectoral cooperation'*. (MA 2005a: 14)

Examples of management practices that currently utilise an ecosystem based approach are sustainable forest management, integrated river basin management and integrated marine and coastal zone management. An ecosystem based approach is central to the approach adopted by the CBD.

3. Climate Change Policy since 1997

Climate change is the most severe problem that we are facing today – more serious even than the threat of terrorism
Professor David King, Chief Scientific Advisor to the Government
Science, vol. 303: 176-7, 9 January 2004

Key chapter messages

1. The Labour government has, since 1997, taken some action that begins to address climate change, but not nearly enough to address the extent of the problem as indicated by the science.
2. The UK Government, notably Tony Blair, has played a leading role in advancing the climate change agenda on the international stage.
3. The lead that the UK has taken in pushing climate change on the international agenda has not been matched by a similar ambition at the domestic level.
4. The government's target to stabilise greenhouse gas concentrations at 550ppm CO_2 is much higher than the 350ppm CO_2 that the science now suggests is necessary to avoid dangerous climate change.
5. Provisional figures indicate that carbon emissions rose 1.25% in 2006 to reach their highest level since Labour came to power – some 2.7% higher than in 1997 and 3.7% higher than their lowest level in 1999.
6. The UK should meet its Kyoto target of reducing greenhouse gas emissions by at least 12.5% below baseline 1990 emissions levels over the period 2008-2012. This achievement is largely the fortuitous result of the switch from coal to gas for power generation during the early 1990s rather than a deliberate Government emissions reduction policy. The UK will fail to meet its tougher domestic goal of reducing CO_2 emissions by 20% below base levels by 2010.
7. Despite introducing the Renewable Obligation, the Government has failed to do enough to stimulate significant growth in the renewables sector and looks set to miss its target of 10% of electricity to be generated from renewables by 2010.
8. The Government has made a U-turn on its policy towards nuclear power since its 2003 Energy White Paper, with Tony Blair publicly expressing the Government's intention to support the construction of new nuclear power stations (despite failing to carry out a legitimate public consultation on this hugely controversial issue).
9. To be successful in the long term, the Government's approach to energy policy needs to consider the social and technical institutional and infrastructural systems, which determine the way energy is generated, supplied and used. Without a more holistic approach to understanding the nature of energy policy, a successful transition to a low carbon economy is highly unlikely to be achieved.
10. There are very few measures to reduce GHG emissions in the business sector. Some progress has been made in reducing emissions via the Climate Change Levy and Climate Change Agreements, but most of the emissions reductions were the result of the initial 'announcement effect'. The EU ETS will have little if any impact on Greenhouse Gas Emissions from the business sector before 2012.

11. The domestic sector offers opportunities for a range of easily achievable measures to reduce emissions. To date, however, the Government has largely failed to take advantage of these opportunities. Policy consists of a modest set of measures that fall well short of what is necessary to deliver serious emission reductions. The Government has repeatedly failed to meet its own targets for reductions in this sector.
12. In the transport sector, carbon dioxide emissions are rising faster than from any other sector and are likely to become the largest source of UK emissions in the near future. The Labour Government started out with great aspirations for reforming transport policy, but perhaps in no other policy area has its efforts fallen so short. Its reluctance to make concerted efforts to reduce the amount that people drive or fly implies little hope for future reductions from this sector.
13. The fuel protests in 2000 profoundly shocked the Government, so although the Treasury has introduced some innovative tax measures, it has subsequently been extremely nervous about anything that might be construed as increasing the cost of motoring.
14. The Government's 'predict and provide' approach to aviation and the lack of any substantive carbon reduction measures represents a serious policy failure.

3.1. Introduction

The Government's broad approach to environmental policy has been outlined in its two sustainable development strategy documents: 'A Better Quality of Life' (DETR 1999), and 'Securing the Future' (DEFRA 2005a). Both set out an overall framework for achieving sustainable development within which climate change and biodiversity play a central part. This chapter examines climate change policy; Chapter 3 examines biodiversity. The analysis in both is based on documentary evidence drawn from Government reports, Parliamentary Committees, independent reports, academic literature and evidence from the interviews with key actors undertaken for this study.

This study of climate change policy focuses on the UK-level and, where appropriate, England. It will not discuss specifically the devolved administrations in Scotland, Wales and Northern Ireland, although the design and implementation of climate change policies in these countries is obviously important. However, England has by far the largest population, contributes the largest share of greenhouse gas emissions and is the only country where policy is the direct responsibility of the Blair Government.

3.2. Labour and Climate Change: An Overview

Tony Blair took a strong personal interest in climate change throughout his time as Prime Minister. He expressed his concern about the problem on many occasions and in numerous documents, as illustrated by this statement in his Foreword to the Climate Change Programme 2006:

> *'Climate change is probably the greatest long-term challenge facing the human race. That is why I have made it a top priority for this government, at home and internationally'.*

However, in this analysis of the Government's climate change programme we will identify a sharp disjunction between Tony Blair's agenda-setting approach on the international stage, and the weakness of the Government's domestic climate change programme. As the former Secretary of State for the Environment, David Miliband, commented in a recent review:

> *'New Labour has been good at driving the international environmental agenda, not good enough at reducing domestic carbon emissions'.*
> (*The Observer*, 25.03.2007, Review: 24)

3.2.1. International Diplomacy

The UK is responsible for about 2% of global CO_2 emissions, although as the first industrial nation its cumulative historic responsibility is significantly larger. Obviously, UK climate change policy alone will have only a limited impact on global emissions, so international cooperation – a key message of the Stern Review – is essential.

It is on the international stage that Tony Blair has done most to give substance to his concern about climate change. From the start, the UK Labour Government played a major role on the international stage as part of the EU, which by acting as a bloc has become an increasingly important actor in environmental diplomacy. For example, the EU performed an important brokerage role during the Kyoto Protocol negotiations. Subsequently, after President Bush's decision to withdraw US support for the Kyoto Protocol in 2001, the EU was a key actor in the bargaining processes that eventually led to the ratification of the Protocol in 2004.

UK diplomatic efforts have also contributed to the agreement of several important EU climate change targets. Most recently, in March 2007 the EU Heads of Government agreed a binding target that by 2020 EU greenhouse gas emissions would be cut by at least 20% compared to 1990 levels and to increase this reduction target to 30% as part of a future post-Kyoto international agreement. It also set a target that at least 20% of energy consumption in the EU would come from renewable sources by 2020, although the individual contribution made by each country is still to be agreed.

More generally, it is widely acknowledged that Tony Blair has personally played a major role in putting climate change on the international agenda. Jonathon Porritt, Chairman of the Sustainable Development Commission and longstanding environmental campaigner, observes that:

> *'We had a Prime Minister who has done far more on the international scene around climate change than any other political leader in the world. In fact probably more than all of them put together! Many of the things going on now over and above the Kyoto process were driven by UK diplomacy'.*
> (personal interview).

One particular achievement was to make climate change a priority for the UK's presidency of the 2005 G8 Summit in Gleneagles. Prior to the Summit the UK sponsored a major international symposium on climate change in Exeter. The G8 Summit produced a Plan of Action to speed international efforts to reduce greenhouse gas emissions, and initiated an international dialogue on *Climate Change, Clean Energy and Sustainable Development* involving 20 countries with the greatest energy consumption (Stern 2007: 515). The UK's Presidency of the EU in 2005 saw successful bilateral discussions that resulted in an EU-China Partnership on Climate Change and an EU-India Initiative in Clean Development and Climate Change. In April 2007, the Foreign Secretary, Margaret Beckett, put climate change on the agenda of the UN Security Council for the first time. At the June 2007 G8 summit, Tony Blair clearly worked hard behind the scenes to persuade George Bush to shift his position on climate change, although it is hard to judge what impact Blair had and whether he was genuinely satisfied with the outcome!

This praise for the Government's agenda-setting role is not unqualified. In particular, one message that Tony Blair has consistently repeated – for example in his Davos speech in January 2005 - is that climate change can be largely solved by science and technology, which rather sidesteps the major behavioural changes that will certainly be required (Blair 2005). Clearly, the Prime Minister emphasised this message because of his belief that the argument that climate change can only be limited by cutting growth and living standards would never win international agreement – notably the support of the USA. However, it is also a message that may help to explain the puzzle as to why there is such a dichotomy between Blair's record on the international stage and his Government's domestic climate change policy.

3.2.2. Domestic Policy

Targets

The Labour Government currently has three domestic emission reduction targets:

- The 1997 Kyoto Protocol requires the UK to reduce greenhouse gas emissions (GHG) by at least 12.5% below the baseline 1990 emissions levels over the period 2008-2012.

- In 1997 the Government also set a tougher domestic goal of reducing carbon dioxide (CO_2) emissions by 20% below the base levels by 2010.

- In the Energy White Paper (2003) the Government announced a long-term target to reduce CO_2 emissions by 60% below base levels by 2050, with real progress towards this goal by 2020. The draft Climate Change Bill published in March 2007 proposes making the commitment to reduce CO_2 emissions by 60% below base levels by 2050 legally binding.

In addition, the Climate Change Bill would quantify a fourth target - giving substance to the promise to achieve 'real progress towards this goal by 2020' - by setting a further

legally binding target of a 26-32% reduction in base levels CO_2 by 2020.[9] This new target would be consistent with the agreement in March 2007 by the EU Heads of Government of a binding target to reduce EU greenhouse gas emissions by at least 20% compared to 1990 levels by 2020 and to increase this reduction target to 30% as part of a future post-Kyoto international agreement.

Climate Change Programme: Outline of Key Developments

The Labour Government did not inherit a long tradition of climate change policy. UK policy on climate change really only started with its support for the UN Framework Convention on Climate Change agreed at the 1992 Rio Earth Summit, and ratified by the UK in December 1993. Under this treaty, the UK made a voluntary commitment to reduce emissions of the major GHG gases to 1990 levels by 2000. The Conservative Government published the first UK Climate Change Programme in January 1994, which set out the Government's strategy and the range of policy measures for achieving this target (HM Government 1994b).

Within weeks of coming to power in 1997, the Labour Government had signed up to the Kyoto target of a 12.5% reduction in greenhouse gas emissions and the more ambitious domestic target of a 20% CO_2 emissions reduction by 2010.

Subsequently, the Government's climate change policy has evolved in a range of reviews and documents (see Table 3.1). The overall strategy was set out in two Climate Change Programmes, published in 2000 and 2006[10] (DETR 2000a; DEFRA 2006a), each stating the policies and priorities for action needed to achieve the UK emission targets. In addition, there have been separate, but linked, policy statements in key sectors, notably on energy, energy efficiency and transport. Each document outlined existing policies and most introduced some new initiatives.

[9] It is important to note that in June 1996 the EU Council of Ministers agreed the objective of limiting global average temperature increases to no more than 2°C above pre-industrial levels and that it is this objective that guides UK emission reduction targets.

[10] The two Climate Change Programmes will be referred to throughout as CCP 2000 and CCP 2006.

Table 3.1: Key Strategic Developments in Labour's Climate Change Policy

2000	Climate Change Programme
2003	Aviation White Paper Energy Review and Energy White Paper,
2004	Energy Efficiency Action Plan Future of Transport White Paper
2006	Climate Change Programme Energy Review Stern Review
2007	Draft Climate Change Bill Energy White Paper Planning White Paper

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The CCP 2000 outlined a programme that was predicted to achieve a 23% cut in GHG and a 19% reduction in carbon dioxide emissions against the base year by 2010 (the latter representing a formal admission that the Government's voluntary target *might* not be met). New measures announced around this time included the Climate Change Levy and related voluntary industry sector agreements to cut emissions, the Renewables Obligation, the UK emissions trading scheme, the reform of vehicle excise duty and company car tax and a new Energy Efficiency Commitment.

As reductions in carbon emission levels began to flatten out, the 2003 Energy White Paper offered a real attempt to grapple strategically with the climate change challenge, followed in 2004 by the Energy Efficiency Action Plan. Yet the CCP 2006 had to concede that *'achieving our domestic target has become more challenging'* since CCP 2000, although it declared that with further policy initiatives it was *'still within reach'* (DEFRA 2006a: 3). Nevertheless, additional measures outlined in the CCP 2006 were projected to result in no more than a 15-18% reduction in CO_2 by 2010 (see Table 3.2 for details of CCP measures and associated emissions reductions). The most significant of these additional measures – although none will be in operation until 2008 – are Phase 2 of the EU Emissions Trading Scheme (ETS), the new Renewable Transport Fuel Obligation and a strengthening of the Energy Efficiency Commitment. The total emission reductions to be achieved by 2010 were predicted to be 17.1 MtC from existing measures (excluding the Climate Change Levy) and between 7.0-12.0 MtC from the additional measures (depending on the performance of the EU ETS, which is described in detail below).

There have been several important policy developments since the CCP 2006 was published. A new energy review reported in July 2006. Its key recommendation was the green light it gave to Tony Blair's wish to support the building of a new wave of nuclear

power stations (although, as we highlight further below, this element of the review has since been successfully challenged in a legal action prosecuted by Greenpeace). The Stern Review, published in Autumn 2006, was commissioned jointly by the Prime Minister and the Chancellor to provide an economic analysis of climate change. Its broad message, that there are powerful economic arguments to address climate change, has already been widely cited, both in the UK and abroad, although it remains to be seen what kind of influence it will have in the countries it was partly aimed at such as the US, Canada, Australia and others who are still refusing to commit to binding emission reduction targets.

Gordon Brown announced a number of emission reduction measures in the November Pre-Budget 2006, notably a doubling of Air Passenger Duty, increases in fuel duty, further incentives for biofuels and a declared ambition that all new houses be zero carbon by 2016. In Budget 2007 he increased the rate of Vehicle Excise Duty (VED) for the highest band vehicles and reintroduced the fuel duty escalator (albeit delayed for six months). There was also a modest range of financial incentives to encourage behavioural change by individuals, notably special mortgages for energy efficient upgrades on homes, stamp duty exemptions for zero carbon homes, and insulation and central heating grants for pensioners.

In March 2007 David Miliband introduced a draft Climate Change Bill, which is intended to strengthen the institutional and political framework underpinning the climate change strategy, and to set out a vision for how the UK can move towards a low carbon economy (see Box 3.1). One significant element is the inclusion of legally binding carbon budgets, which should prove more effective than five, ten or fifteen year targets. One other initiative, announced in October 2006, intended to improve the coordination of policy across government was the establishment of a new Office for Climate Change, which involves seven Departments sitting down regularly to talk to each other and the Prime Minister.

The Energy White Paper (HM Government 2007a), published in May 2007, reaffirmed the Government's 'preliminary' support for nuclear power, pending the outcome of a new nuclear consultation (see below). Two days earlier it published a Planning White Paper (HM Government 2007b), which set out proposals to make it easier and quicker to push proposals for large infrastructure projects, such as nuclear power stations and wind farms, through the planning system. In the same week a new 'Waste Strategy for England 2007' was published, which aims to make a significant reduction in greenhouse gas emissions by reducing the amount of waste going to landfill and through a range of waste prevention measures.

Box 3.1: Draft Climate Change Bill

A series of clear targets for reducing CO_2 emissions, including making the commitment for a 60% reduction by 2050 and a 26-32% reduction by 2020 legally binding

A new system of legally binding five year 'carbon budgets', set at least 15 years ahead, to provide the clarity of direction and the certainty that individuals and businesses need to invest in low carbon technologies

A new statutory body, the Committee on Climate Change, to provide independent expert advice and guidance to the Government on achieving its targets and staying within its carbon budgets

New enabling powers for the Government to help it implement emissions reduction policies

A new system of annual reporting to Parliament by the Committee on Climate Change to which the Government has to respond, thereby ensuring the Government is held accountable for each five year carbon budget and the 2020 and 2050 targets

A requirement for the Government to report at least every five years on current and predicted impacts of climate change, and its policies and proposals for adapting to climate change.

Table 3.2:
Climate Change Programme 2006: Principal Policy Instruments by Sector

	Timescale covered	Predicted carbon savings in 2010 (MtC)
Energy supply		
Renewables Obligation	2002-2020+?	2.5
EU Emissions Trading Scheme	Phase 1 2005-07; Phase 2 2008-11	3.0-8.0
Business		
Climate change levy	2001-	3.7
Climate change agreements	2001-	2.9
Carbon Trust	2001-	1.2
UK emissions trading scheme	2001-2006	0.3
Building regulations	2002, 2005	0.6
Transport		
Voluntary Agreements package (inc reforms to company car` taxation and VED)	1999-	2.4
Wider transport measures	2000-	0.8
Fuel duty escalator	1993-1999	1.9
Renewable Transport Fuel Obligation	2008-	1.6
Domestic		
Energy Efficiency Commitments	2002-2011	2.1
Building regulations	2002, 2006	1.5
Warm Front & Fuel Poverty programmes	2000-	0.4

Source: DEFRA (2006a: 124-5)

3.3. UK Climate Change Programme – Overall Evaluation

This section provides a broad assessment of the Government's overall climate change strategy by assessing the progress towards meeting its stated targets. However, it is important first to assess the scientific basis of the existing targets.

3.3.1. Should the Emission Reduction Targets be Higher?

The Climate Change Bill aims to reduce UK emissions by 60%. This level of reduction was deemed necessary on the basis of an influential RCEP (2000:1) report, which suggested a global stabilisation target by 2050 of 550ppm CO_2 only. Even at that time, however, the RCEP highlighted the fact that stabilisation at 550ppm CO_2 only was likely

to exceed 2.3°C warming and was therefore above the 2°C warming that members of the EU, including the UK, accept would result in dangerous climate change.

As highlighted in Chapter 2, scientific knowledge on appropriate target concentration levels has now moved on – a fact that is clearly recognised within Government and that is even highlighted within its own Climate Change Programme (see, for example, DEFRA 2006a: 13). As far back as 2004, the Government's Chief Scientist, David King, noted that the science at the time suggested that a target of 450ppm was probably necessary to limit temperature increases to 2°C (EFRAC 2005a: Ev.2) – a view that reflected the consensus at the 2005 Exeter Symposium. Although Tony Blair insisted in February 2005 that he was *'absolutely signed up to the two degrees figure'*, the then Secretary of State for the Environment, Margaret Beckett, regarded it not as a *'firm target'* but as a *'guiding principle'* (EFRAC 2005b: para.27). The CCP 2006 acknowledged the new scientific evidence, but offered no indication that the target should be revised. Subsequently, as Chapter 2 demonstrated, the message has become louder and clearer.

The Stern Review's survey of scientific research indicated a 63-99% chance that stabilisation at 550ppm CO_2 *equivalent* (CO_2e) would exceed the 2°C temperature increase. Note here the introduction of the idea of CO_2 *equivalent* rather than the idea of CO_2 *only*, which the UK Government bases its targets on. As explained in Chapter 2, *CO_2 only* refers only to carbon dioxide and ignores all other greenhouse gases, whereas *CO_2 equivalent* attempts to express the warming effect of all relevant greenhouse gases in terms of the equivalent concentrations of CO_2 that would result in that level of warming. As most other greenhouse gases are more potent in terms of their warming effect than CO_2, *CO_2 only* targets imply a much higher *CO_2 equivalent* concentration as *CO_2 only* ignores the impact of other greenhouse gases. Recent work by the Tyndall Centre suggests that a target of 550ppm CO_2 only equates to 600-750ppm CO_2 equivalent (Anderson and Bows 2007).

As explained in Chapter 2, the IPCC's most recent report now suggests that a maximum equilibrium atmospheric concentration of 350ppm CO_2 only, or 445 CO_2 equivalent, is a more realistic target for achieving a 2°C stabilisation limit and that, in order to meet this target, carbon emissions must peak sometime between 2000 and 2015. In short, the science implies we should aim for 350ppm CO_2 only and that global reductions in net emissions CO_2 must begin as soon as possible and by 2015 at the latest if dangerous climate change is to be avoided.

If this discussion is broadened to economics, Stern's assessment of the scientific evidence is that *'the risks of the worst impacts of climate change can be substantially reduced if greenhouse gas levels in the atmosphere can be stabilised between 450 and 550ppm CO_2e'*. He justifies this range because *'stabilisation at levels below 450ppm CO_2e would require immediate, substantial and rapid cuts in emissions that are likely to be extremely costly, whereas stabilisation above 550ppm CO_2e would imply climatic risks that are very large and likely to be generally viewed as unacceptable'* (Stern 2007: 219).

Stern's 450-550ppm CO_2 equivalent range seems to have been implicitly interpreted by the Treasury as implying that the upper limit is acceptable on the basis of the Treasury's wide citing of the cost of acting to tackle climate change being 1% of global GDP – the figure Stern attaches to achieving 550ppm CO_2 equivalent (EAC 2007a: para.12). Moreover the Climate Change Bill will enshrine the 2050 60% reduction target in law, which is, as explained above, based on a target of achieving 550ppm *CO_2 only*, a figure much lower than the 550ppm *CO_2 equivalent* that Stern refers to, although it is proposed in the draft Bill that targets could be amended by secondary legislation.

In evidence to the EAC, Stern commented that '*we did not offer 550 as a target. What we said is, given the risks at 550, any reasonable target should be below that.*' (Ibid: para.16). Given that Stern comments that a 550ppm CO_2e target '*would be a dangerous place to be, with substantial risks of very unpleasant outcomes*' (Ibid: para.12) and that he argues that 450-500 is achievable, albeit costly - there seems a very strong case for the Government readjusting its target downwards.

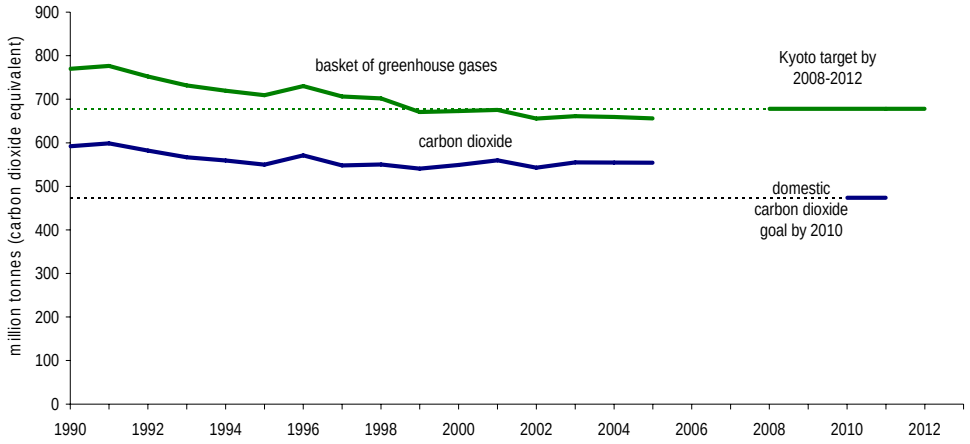
Stern estimates that to stabilise at 450ppm CO_2e by 2050 would require GHG cuts of 85% on the 1990 base year. The EAC makes a slightly different kind of calculation to produce a figure of about 80% (Ibid: para.56). Clearly this figure needs to be firmed up and it is notable that neither reflects the IPPC's indication of the need for a 350ppm CO_2 only target. However, the basic message is clear: the Government's current target of a 60% cut in CO_2 emissions compared to base year by 2050, although ambitious in comparative terms, is almost certainly too low. It is for this reason that the RCEP, in its recent response to the draft Climate Change Bill, emphasises the need to review these scientific developments and urges the Government to ensure that if the 60% target is included in the Bill that it should be capable of being adjusted by secondary legislation in the future (RCEP 2007a).

If the targets are to be toughened up, it is also essential to make this change sooner rather than later. Stern makes very clear the importance of substantive action in the next 10-20 years and IPCC data suggests that global emissions must peak by 2015 at the latest, so the sooner action is taken, the greater the chance of success and the lower the cost in the long-term. Tougher targets would also send out an important international message that would give greater substance to the position that the UK has taken in climate change diplomacy under Tony Blair. One further practical advantage would be that the Climate Change Bill could have the higher CO_2 reduction target in from the start, and a corresponding adjustment of the 2020 interim target.

3.3.2. Performance Against Targets

Putting aside the debate about the need for more stringent targets, it is important to evaluate the performance of the Government against the targets it *has* set for itself. Figure 3.1 illustrates actual emissions to date for the whole basket of greenhouse gases (dark green line) and for carbon dioxide alone (dark blue line) against Kyoto targets for 2008-12 (dotted green line) and domestic carbon dioxide for 2010 (dotted blue line).

Figure 3.1: UK Emissions of Greenhouse Gases: 1990-2005



Source: AEA Energy & Environment available at http://www.defra.gov.uk/environment/statistics/globatmos/gagccukem.htm

Figure 3.2 illustrates the following:

- The UK should meet its Kyoto target of reducing greenhouse gas emissions by at least 12.5% below the baseline 1990 emissions levels over the period 2008-2012. In 2005 UK greenhouse gas emissions were 178.4 MtC or 654.1 $MtCO_2e$, which was 15.6% below 1990 levels. By 2010 they are projected to be 23.6% lower – or 19.8% lower without any adjustment to take account of the EU ETS (DEFRA 2007a, b).

- However, the UK will fall some way short of meeting its tougher domestic goal of reducing CO_2 emissions by 20% below the base levels by 2010. In 2005, CO_2 emissions had fallen to 151.1 MtC or 554.2 $MtCO_2e$, which was a reduction of just 6.4% compared to the 1990 levels. By 2010 they are projected to be 16.2% lower – or 11.2% without any adjustment to take account of the EU ETS (DEFRA 2007a, b).

- Whilst it is too early to make any definitive predictions about the longer term 2020 target included in the Climate Change Bill (let alone the 2050 target), there are several reasons to be pessimistic about the likelihood of the UK meeting it (Maslin et al 2007).

Why will the Kyoto target be met, but the tougher 2010 target missed? The key point is that the bulk of the GHG emission reductions that will deliver the Kyoto target took place in the 1990s, primarily as a result of the 'dash for gas' – the rapid shift in electricity generation from high carbon coal to low carbon gas-fired power stations, although

changes in industrial processes and waste management also contributed. Indeed, the Conservative Government was able to boast in its 1997 manifesto that the UK was 'leading the world in reducing the level of "greenhouse gases" that cause global warming' (Conservative Party 1997: 43) – even though the 'dash for gas' was an unintended consequence of the liberalisation of energy markets coinciding with the development of more efficient, cheaper gas-fired Combined Cycle Gas Turbine (CCGT) plants. As the RCEP 22nd report commented,*'The UK has reduced carbon emissions from burning fossil fuels. But that has been largely fortuitous'* (RCEP 2000: 83). Nevertheless, the Sustainable Development Commission observed, *'The Government stands to meet its Kyoto obligations solely through carbon reductions achieved up to 1995'* (SDC 2006: 7).

Most GHG emission reductions were achieved in the 1990s. When Labour entered office in 1997 carbon emissions were predicted to continue falling, so the Government felt confident enough not only to support Kyoto, but to set the tougher 2010 target. The Government recognised that further measures would be needed – certainly to achieve the 20% target. In the first term, great hope was placed on two policy initiatives: the integrated transport plan (DETR 1998) championed by John Prescott, which was intended to produce a shift away from road transport, and Gordon Brown's 1999 proposal to introduce a Climate Change Levy to surcharge businesses on their energy consumption.

The publication of Climate Change Programme 2000 did little to dispel the sense of complacency that characterised the Government's approach. The document conceded that current policies would deliver emission reductions of only 15% by 2010, rather than the 20% target. However, it was claimed that the additional package of measures outlined in CCP 2000 meant that carbon dioxide emissions *'could be reduced by an estimated 19% below 1990 levels by 2010'*, which together with unquantified policies *'could also achieve the domestic goal'* (DETR 2000a: 5) – hardly a confident, let alone an ambitious, declaration. Moreover, the RCEP severely criticised key elements of CCP 2000, suggesting that some measures would either not be in place or would not deliver predicted emission reductions in time to achieve the 2010 target. It concluded that there was *'something of a hole in the government's climate change programme'* (RCEP 2000: 80). Thus the Government was already aware that its 2010 target might not be achieved, but although it still had time to remedy the situation, it did not do so.

Meanwhile the pace of emission reductions slowed dramatically, with emissions actually rising in four out of six years between 1998-2003 inclusive (EAC 2004a: para.17). By 2003, carbon emissions were more or less back to where they were in 1997. The main reason for this was the higher than anticipated levels of sustained economic growth (in part a result of Government economic policy), which led to increased demand for electricity in the business and domestic sectors, and stimulated transport growth. The Energy Minister, Brian Wilson, warned in 2002 that increases in carbon emissions from the energy sector in the previous two years *'for anyone who might have grown complacent, these figures demand that we must do more to address our environmental obligations'* (quoted in EAC 2002: para.79). A year later, the steady rise in global gas prices meant that in 2003 more, not less, coal was burnt in power stations than in the previous year.

Nor was the Government short of official criticism and advice about the shortcomings of its climate change strategy. The Sustainable Development Commission published a policy audit of the climate change programme in February 2003, which predicted that *'without further measures, the UK will fall well short of the Government's goal of reducing carbon dioxide emissions by 20% from 1990 levels by 2010'* (SDC 2003: 1). Later the same year the Environmental Audit Committee in its report on the pre-Budget 2002 criticised the climate change strategy as '*seriously off course'* and recommended that '*current progress and future projections be reviewed as a matter of urgency*'(EAC 2003: para.34). In 2004 it repeated its criticism that '*Recent data supports our contention that the Climate Change Strategy is seriously off-course*' (EAC 2004a: para.14). The Government did respond, launching a number of important initiatives including the 2003 Energy Review and White Paper, a Transport White Paper and the review process that led to the CCP 2006. Yet by 2004 the Government acknowledged that the UK would not meet the 2010 target (ENDS Report 2004: no.359, p.48; EFRAC 2005b: para.25, fn.33). In March 2005, the Environment, Farming and Rural Affairs Committee concluded its report on the Climate Change Programme 2000 by expressing its frustration at the *'absence of a clear central direction to the Government's work on climate change'* (EFRAC 2005b: p.49, para.1).

In short, despite the early warnings the Government did not introduce sufficiently stringent and effective emissions reduction measures in time to turn things round to meet the 2010 target. On the contrary, provisional figures indicate that carbon emissions rose 1.25% in 2006 to reach their highest level since Labour came to power – some 2.7% higher than in 1997 and 3.7% higher than the lowest level in 1999 (DEFRA 2007c).

Moreover, the CCP 2006 acknowledged that a number of factors, notably sustained and significant economic growth, will contribute to a further rise in UK emissions after 2010[11], hence the range of additional measures outlined in the CCP 2006 that are intended to keep the UK on target to meet its firmed up 2020 target of 26-32% cuts. Yet these measures and the CCP strategy as a whole met almost universal criticism for their lack of ambition.

The SDC stated that *'it does not believe that the CCP 2006 is a sufficient set of policies to prepare the UK to meet the challenge of climate change'* (SDC 2006: Para.20). It condemned the Government's strategy for failing to deliver absolute cuts in emissions and succeeding only in *'slowing the growth in emissions that would otherwise have occurred'* (para.22) thereby enhancing *'the prospect that more painful and costly actions will be required in the longer term to correct the mistakes currently being committed'* (para.24).

A recent independent scientific audit of the Government's current policies concludes that the target of achieving a GHG emissions reduction of around 30% by 2020 is *'very optimistic'*. Indeed, the report suggests that the present policies would only achieve GHG emissions reductions of between 12-17% by 2020 (Maslin et al 2007: 2).

[11] A warning clearly stated six years earlier by the RCEP (2000).

As noted above, there have been some policy developments since CCP 2006, particularly from the Treasury. The doubling of Air Passenger Duty and the restoration of the fuel duty escalator are the measures that will have the biggest impact on carbon emissions, although nowhere near enough to enable the 2010 target to be met. It is questionable, however, what impact these initiatives will have on the levels of flying and car use (see 3.7.3-3.7.4).

Having provided a broad overall evaluation of the Climate Change Programme, the following sections examine the four major economic sectors that, by source, contribute the vast bulk of all UK CO_2 emissions. It omits Agriculture and the Public Sector as they account for less than 3% of emissions and are not predicted to see any significant changes over the next decade or so. The framework used is based on the Government's CCP 2006.

3.4. Energy

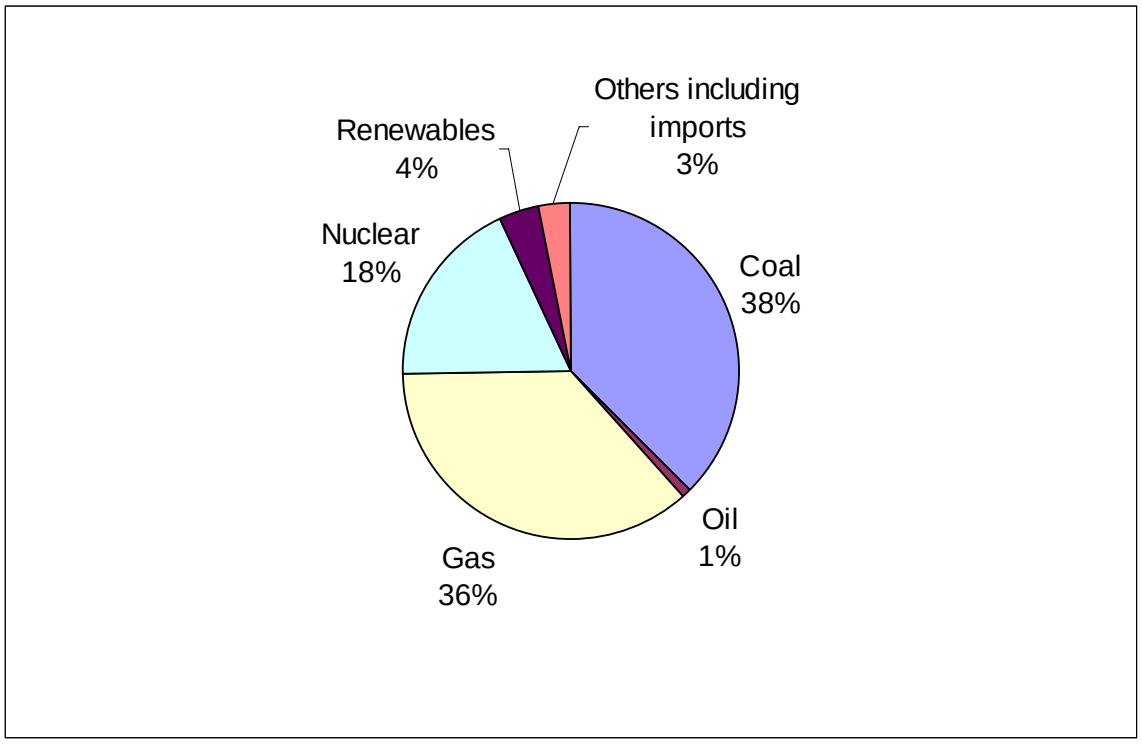
3.4.1. Context

Fossil fuel combustion as whole, including from transport, accounts for over 80% of all UK CO_2 emissions. In 2005 energy industries alone were responsible for carbon dioxide emissions of 56.8 MtC or 208 $MtC0_2e$, which was about 37% of total UK emissions (DEFRA 2007b).[12] This figure represents a significant decline on 1990 levels primarily due to the 'dash for gas' during the 1990s. Emissions, however, have risen again steadily over recent years because increased demand for electricity from other sectors and the high price of gas have prompted some switching back to coal. Emissions levels are now around 3% higher than they were when Labour came to power in 1997.

Whilst gas is now the major supplier of electricity, Figure 3.3 shows that the UK has a diverse electricity generation mix.

[12] These figures deal only with energy industries and exclude emissions from the combustion of fossil fuels from road transport, non-energy industry, residential and 'other' sectors.

Figure 3.3: UK Electricity Generation Mix 2006 (%)



Source: HM Government 2007a

It has been apparent for some time that over the next two decades substantial new investment in electricity generation will be needed to replace the closure of coal and nuclear power stations and to meet expected growth in demand for electricity. Around a third of coal-fired power stations must close by 2015 as they will not comply with EU environmental legislation – the Large Combustion Plant Directive, which sets limits on emissions of sulphur dioxide (SO_2), oxides of nitrogen (NOx) and other potentially harmful particulate matter (PM). Without new nuclear power stations or the extension of the lifespan of existing reactors, the proportion of electricity generated by nuclear will fall rapidly by the early 2020s. The 2007 Energy White Paper estimates that, based on current demand projections, by 2020 the UK will need new electricity generation capacity of 20-25GW, which is equivalent to about 30% of current capacity, and up to another 10GW by 2030 (HM Government 2007a: para.5.1.12-3). Crucially, the majority of that new capacity will be needed in the next ten years to plug the predicted gap between 2015-2020 (EAC 2006a: para.15).

However, it should be noted that this kind of 'predict and provide' approach to energy policy, which underpins the idea of a possible future 'gap' between energy demand and supply, has proved to be seriously flawed in the past. As Scott and Watson (2006) point out, in the 1980s ten new nuclear power stations were thought necessary to meet future energy needs. In the end, however, only one, Sizewell B, was built. There seems to be little empirical basis for the change in emphasis of the 2007 Energy White Paper, which makes much of the existence of a potential gap, relative to the far more rigorously prepared and more optimistic 2003 Energy White Paper (see next section).

3.4.2. Energy Policy – Overview

The traditional focus of energy policy has been to ensure reliable, secure energy supplies that deliver affordable energy to the business and domestic sectors. The responsibility for energy policy officially lies with the DTI[13], whose priority is to enhance competitiveness. Although it is not quite so straightforward as DEFRA is responsible for energy efficiency and climate change whilst DoT and DCLG also make energy-relevant decisions. The need for energy policy to deliver reductions in carbon emissions is a very recent development. One clear requirement for it to happen is greater coherency within the machinery of government. The recent changes implemented by Gordon Brown upon becoming Prime Minister appear to do nothing to help with this issue.

Early in Labour's first term, the power sector had a low priority, with the Government clearly confident that the 'dash for gas' would deliver the necessary emissions cuts in this sector. Indeed, it imposed a two-year moratorium (1998-2000) on the construction of new Combined Cycle Gas Turbine power stations in an attempt to protect the diversity of energy supply and, specifically, the coal industry – an action that could only result in increased carbon emissions. The CCP 2000 did set a target for 10% of electricity to be generated by renewable energy by 2010, although there was a proviso *'subject to the cost to consumers being acceptable'*, and there were very few new measures to support this fledgling industry.

However, the publication of the RCEP's 22nd report, 'Energy – The Changing Climate', in 2000 initiated a period of debate, informed by a Performance and Innovation Unit (2002) report, and culminating in an Energy Review and an Energy White Paper in 2003. The 2003 White Paper (DTI 2003) for the first time brought climate change to the heart of energy policy by setting the 60% carbon dioxide emission reduction target as one of four key goals - alongside the maintenance of energy supplies; the promotion of economic growth, competitiveness and productivity; and the provision of adequate, affordable heating to every home. It endorsed the emerging view that priority in achieving carbon emission reductions should go to improving energy efficiency and expanding renewable energy. It maintained the target of 10% of electricity generation by 2010 to come from renewable sources, but apart from an 'aspiration' for it to be 20% by 2020, it set no other specific targets for electricity generation. The construction of new nuclear power stations was deemed unattractive on cost grounds and because of the intractable issue of nuclear waste disposal, but it was not ruled out as a possible future way of meeting carbon reduction targets.

The 2003 White Paper's broad strategic vision was well received by most commentators. However, as the EAC **(**2003a: paras 6-20) concluded, it was strong on vision but weak in terms of specific targets, policy instruments and mechanisms.

[13] The DTI was renamed the Department for Business Enterprise and Regulatory Reform when Gordon Brown formed his first Government. However, as this analysis is based on the work of the DTI, we will use this acronym throughout.

One important policy development, strongly supported by the Government, was the launch in 2005 of the EU Emissions Trading Scheme (EU ETS), which includes the energy supply industry.

Soon after Labour's re-election for a third consecutive term in office, the Prime Minister announced another energy review, just two and half years after the 2003 White Paper. Various explanations have been offered for this decision, including claims that the deterioration in carbon emission trends since the White Paper justified a review of policy and security concerns about a dependency on imported gas (EAC 2006a: paras.159-65). However, it is widely accepted that the primary reason was Tony Blair's belief that the previous decision not to recommend nuclear new build had to be reversed - he had already stated that a decision on nuclear needed to be made during the current parliament, making little secret of his support for the nuclear industry (Ibid: para.161). Even the Trade and Industry Committee (2006), likely to be more sympathetic to the nuclear case than the EAC, expressed its concern about the manner in which the 2006 Energy Review had been conducted: *'Throughout the process, the Government has hinted strongly that it has already made its mind up on nuclear power. The last review took three years to complete, yet this one has been conducted in the space of just six months, and has focused primarily on the electricity sector, at the expense of consideration of transport and heating – both equally important sources of carbon emissions in the UK. This has not been an Energy Review, but an Electricity Review'* (Ibid: para.9). Certainly, it came as a surprise to no one that the Energy Review eventually stated firmly that *'nuclear has a role to play in the future UK generating mix'*.

In July 2006, Greenpeace prosecuted a successful legal action against the DTI over the consultation process used within the Energy Review with regards to nuclear new build. The judge ruled that the consultation process underpinning the Energy Review was illegitimate. In the words of Mr Justice Sullivan, the process upon which the decision to allow the construction of new nuclear power plants was based was *'very seriously flawed'*, *'misleading'* and *'procedurally unfair'* (*The Guardian*, 15 February 2007; *The Independent* 3 May 2007). This adds considerable strength to the views of those who believe that the Energy Review was driven by the Prime Minister's pro-nuclear agenda

The Government subsequently announced a new consultation on nuclear new build. This implies that the new consultation process will be improved so as to overcome the shortfalls of the previous one. Tony Blair, however, on several occasions stated that the new consultation process *'won't affect the policy at all'* (*The Guardian*, 15 February 2007). This statement obviously raises grave concerns as to whether the new consultation process will in fact achieve the kind of legitimacy for the Government's policy on nuclear power that the previous consultation failed to do. If the consultation won't affect policy then why is the public being consulted at all, other than to satisfy legal requirements?

When the delayed Energy White Paper was finally published in May 2007, it largely repeated the recommendations of the Energy Review on nuclear power, reforming the Renewables Obligation, strengthening the EU ETS and offering support for Carbon Capture and Storage.

3.4.3. Energy Policy –Evaluation

The Government emission reduction policies in the energy supply sector have pursued two main objectives (Maslin et al 2007: 9):

1. to generate a shift towards less carbon-intensive fuels (notably renewable energy, CHP, microgeneration, nuclear power)
2. to encourage the use of carbon-abatement measures which generate a reduction in the amount of carbon emitted from carbon-intensive fuels - notably the EU ETS and Carbon Capture and Storage (see below)

Renewable Energy

As outlined above, the Government currently has a target that renewable energy should provide 10% of electricity supplies by 2010, with an aspiration to reach 20% by 2020. This aspiration may become a firm target as a result of the agreement by the EU Heads of Government in March 2007 that 20% of EU electricity should come from renewable sources by 2020.

When Labour came to office in 1997 the renewables sector contributed about 2% of electricity generation. The only significant Government policy encouraging renewables was the Non-Fossil Fuels Obligation (NFFO), which the Conservative Government had introduced as a means of subsidising the nuclear industry. The NFFO had limited success, partly because many of the proposals it contracted got blocked or seriously delayed in the planning process. For example, between 1994-1998, of eighteen wind developments that went before local planning inquiries, just two small schemes won approval (RCEP 2000: 216).

Yet the Labour Government initially did very little to address the slow growth of the renewable energy sector. In 1999 it set a target of 5% of electricity to come from renewable sources by 2003 and 10% by 2010, but there were no new measures to deliver these targets. The RCEP (2000) report, which identified the huge potential of wind energy and the failure of existing policy to support the fledgling renewable energy sector, undoubtedly contributed to a more positive approach. The CCP 2000 announced what has become the Government's main policy instrument for promoting renewable energy - the Renewables Obligation – although it did not come into operation until 2002.

The Renewables Obligation was a significant initiative. It requires electricity suppliers to provide a specific proportion of their electricity from approved renewable sources each year, in return for Renewables Obligation Certificates (ROCs). If the supplier fails to meet its target, it can purchase additional ROCs. The original announcement increased the percentage to be sourced annually from renewables up to 10.4% in 2010-11, but subsequently this was extended in December 2003 to 15.4% by 2015-16 to address a lack of investor confidence, which was threatening the value of ROCs. For the same reason, the Renewables Obligation will remain in place until 2027. The Renewables Obligation (together with the exemption from the Climate Change Levy) is projected to provide financial support worth up to £1 billion per year for the suppliers of renewable energy in

2010, rising to £2 billion annually by 2020 with the changes proposed in the 2007 White Paper (HM Government 2007a: 14).

In addition, the Government has introduced a modest range of capital grant schemes to promote renewable technologies. These schemes include the £89m New Opportunities Fund for wind and energy crop production, a £500m Energy Technology programme (2002-08) to promote offshore wind, biomass, solar photovoltaics and research and development, a £50m Marine Renewables Deployment Fund (2004-) to support wave and tidal electricity schemes, a £10-15m pool to subsidise schemes that encourage biomass burning and a £50m Carbon Abatement Technology Scheme.

The Renewables Obligation has undoubtedly helped stimulate the growth of the renewables sector: eligible renewable sources generated around 4% of total electricity supplied to consumers in 2005, up from 1.8% in 2002 (HM Government 2007a: para.5.3.18). Most of the growth is in energy from wind, biofuel and waste.

However, with renewable energy contributing just 4.2% of electricity in 2006 (HM Government 2007a: Table 5.3.1), it is not surprising that there is a consensus that the Government 2010 target will be missed by some way (EAC 2006a: para.46; Maslin et al 2007:15). Indeed, the Government acknowledges that without policy changes, the share will be just 11.4% in 2015, compared to the target of 15.4% (HM Government 2007a: para.5.3.24). The Carbon Trust estimates that existing policies will deliver only 10.1% by 2020, and with policy amendments it might reach a maximum of 14.9% (Maslin et al 2007: 15).

Several factors explain this shortfall:

- Onshore wind farms, helped by the Renewables Obligation, have become economically competitive and have contributed a large part of the growth in renewables since 2002. Nevertheless, there is still huge local opposition to most proposed wind farms. The main objection is to the visual impact they will have on the landscape – especially as the windiest locations are typically in areas of great natural beauty. It takes an average of 21 months for windfarms to gain planning consent (HM Government 2007a: para.5.3.64).

- Despite the enormous potential for offshore wind energy, progress in developing it is *'distressingly slow'* (EAC 2006a: para.47). By early 2006, of 18 projects allocated by the Crown Estate in Round 1 of the site allocations in 2001, just four were operational; and of 15 larger, more important, Round 2 projects allocated in 2003, only four had got as far as making planning applications to the DTI. A major barrier is that offshore projects have proven more expensive than originally expected, due to rising steel prices and increased global demand for wind turbines. (EAC 2006a: para.47; HM Government 2007a: para.5.3.24).

- Overall, there is currently 11GW of renewables capacity awaiting consent in the planning system, of which almost 8GW is onshore wind (British Wind Energy Assiciation 2007: 5).

- The Renewables Obligation has been criticised for favouring established, more economic technologies, notably onshore wind and landfill gas, but doing little to help the nascent technologies, such as offshore wind, wave and solar power, that are further from the market.

- Amongst a range of other regulatory and financial barriers, there are bureaucratic difficulties and significant costs associated with connecting new renewable projects – typically in geographically isolated locations – to the national grid.

- The government's approach to encouraging low carbon energy solutions, including renewables, also fails to consider the social and technical institutional and infrastructural systems within which energy is generated, supplied and used. Without a more holistic approach to understanding the nature of energy policy, a successful transition to a low carbon economy is highly unlikely to be achieved.

The 2007 Energy White Paper sets out several proposals to address these issues and predicts that these reforms will ensure that renewables provide around 15% of electricity supplied by 2015, although it remains more tentative about the aspirational 2020 target of 20%. The most notable reforms are:

The Renewables Obligation will be extended to 20% by 2020 but increases above the 15.4% by 2015 will not occur at pre-determined stages, as with existing announcements, but on a 'guaranteed headroom' basis so that Obligation levels will only rise if they are likely to be exceeded by the actual level of renewable electricity in the system (HM Government 2007a: para.5.3.29). One implication is that there will be little pressure on suppliers to meet the 20% target, which is likely to undermine its effectiveness (Maslin et al 2007: 14). On the other hand, the agreement of the EU Heads of Government to a binding target to reduce EU greenhouse gas emissions by at least 20%, with a 20% target for renewables, should increase pressure on the Government to ensure the UK meets this target.

The Renewables Obligation will also be reformed by the introduction of banding to offer more financial support for the less established, more expensive technologies, particularly those in the post-demonstration stage (e.g. offshore wind) and still emerging technologies (e.g. wave and tidal power) (HM Government 2007a: Table 5.3.1). However, although the amount of resources being invested in the renewables industry has, and continues to, increase – to reach around £1 billion annually by 2010 – it remains small by comparison to many other EU states, and there is real concern that a commitment to a new generation of nuclear power stations will leach resources away from the renewables industry. The Government will also work with OFGEM to ease access of renewable projects to the National Grid, but the details of these changes remain unclear.

A modest reform of planning rules was made in 2004 through the Regional Approval for Renewable Energy Projects, which simplified the planning process and encouraged planning authorities to favour renewable projects, but only where the technology was 'viable'. The Planning White Paper (HM Government 2007b) proposes far-reaching reforms of the planning regulations to ease large energy infrastructure projects, such as big wind farms (over 50MW onshore, over 100MW offshore) and nuclear power stations. Yet it says much about the DTI's lack of commitment to renewable energy that despite the planning problems that have held back the development of wind since before Labour took office, it is only now that the Government wants to promote nuclear energy – allowing renewable energy to piggyback on nuclear - that this problem is being seriously addressed. Moreover, many of the current planning blockages reflect the unwillingness of Government (central and local) to apply the existing planning rules (as amended in 2004), rather than a failure of the rules themselves.

Whether or not these reforms will ensure that the 2015 renewables target is met remains uncertain, but they should certainly boost the sector. However, the Government has been very slow to take action on these key challenges. Certainly, if judged by comparison to other countries, the UK lags well behind most other EU countries in the share of electricity generated by renewables. Significantly, despite having the best natural wind resources in Europe, in 2005 the amount of installed wind power was 1,353MW, compared to 18,428MW in Germany, 10,027MW in Spain and 3,122MW in Denmark.

Combined Heat and Power (CHP) and Microgeneration

CHP is an efficient way of providing heat and electricity at the same time. Although it may not qualify as a genuinely low carbon technology, it has plenty of supporters, including the Sustainable Development Commission (2006: paras.40-3) and the Environmental Audit Committee (2006a: para.34) as it offers a more carbon-efficient way of burning fossil fuels. However, the Government target of 10Gwe of good quality CHP by 2010 is unlikely to be met because adverse market conditions have made it uncompetitive.

There is huge scope for microgeneration – the production of heat or electricity on a small-scale from a low carbon source – to make a significant contribution to reducing carbon emissions, although it should be noted that much of the currently practical microgeneration technology uses natural gas and low carbon is not inherent in the definition of microgeneration. The Energy Review 2006 cites an Energy Savings Trust report in 2005 suggesting that microgeneration could reduce household emissions by about 15% by 2050. Reforms to the National Grid, enabling microgeneration to provide electricity at the point of demand, would help. A wide range of technologies can be used, including heat pumps, fuel cells, micro-CHP, micro-hydro, micro-wind, bio-energy and solar.

Under current conditions micro-generation is not an economically attractive prospect for many consumers or energy companies due to high up front costs and long pay-back times. The main plank of the Government's strategy is the grants-based approach (Low Carbon Buildings Programme) aimed at encouraging domestic micro-generation.

However, it has been unable to meet consumer demand for microgeneration technologies with monthly grants budget allocations regularly being spent within a day or so of the start of each month. The scheme was suspended in March 2007 after widespread press criticism, and relaunched in May, with the monthly budget dropped. However, in order to spread the money more widely, there are significant cuts in the household grants awarded to solar panels and wind turbines, which make them financially far less attractive. Without a massive increase in the budget, the grants-based approach seems unlikely to have a major impact in encouraging micro-generation.

The proposals in the Planning White Paper to ease planning permission to enable householders to install microgeneration technologies will also have only a marginal impact without altering the financial incentives.

A more fundamental change is essential to level the playing field for microgeneration, relative to other, more established technologies, in terms of the fiscal system and the market settlement system for electricity (Watson et al. 2006). Such reforms should aim to reduce upfront costs for microgeneration technologies by enabling consumers to offset investment costs against their tax bill and to extend the settlement system so that excess electricity exported back to the grid can be sold for the real-time market price, similar to the German approach (See Box 3.4). The potential knock-on benefits of such an approach include changing patterns of energy consumption and reducing overall demand for electricity.

Nuclear Power

The 2006 Energy Review and 2007 White Paper represent a major shift in Government policy in favour of the construction of new nuclear power stations.

There is some debate about whether nuclear power is ‘zero carbon’ as is often claimed, once the construction and decommissioning of the plant and the processing and transport of uranium is taken into account. However, the evidence suggests that whilst nuclear power does result in some carbon emissions, it is on the same low level as wind, so it seems reasonable to describe it as a ‘low carbon energy source (Trade and Industry Committee 2006: paras.188-94).

Yet it is still extraordinary that the Government is prepared to encourage the construction of nuclear power stations when so many fundamental environmental, financial and safety issues remain unresolved. Rather than examine these in detail here, we simply list some of the major issues and questions, and refer the interested reader to two excellent recent parliamentary committee reports: the EAC (2006a) *Keeping the Lights On: Nuclear, Renewables and Climate Change* and the Trade and Industry Committee (2006) *New Nuclear? Examining the Issues.*

- Given the continuing failure to resolve the extant problem of the UK’s nuclear waste legacy by finding a technically and politically acceptable solution, would it be wise to commit to the production of yet more waste?

- Would the new nuclear power stations represent an internal security risk in a world subject to a much greater terrorist threat? Does it set a good example at a time when the UK Government is trying to prevent nuclear proliferation elsewhere?

- Can politically and technically acceptable sites be found for new reactors?

- How reliable are the new and still largely untested nuclear technologies that would be used?

- What is the true cost of nuclear power once environmental, social and security costs are considered? Will the huge costs of underwriting nuclear power stations also fall on the Government if no private insurance companies are willing to take on that level of risk?

- Will private companies in the highly liberalised UK energy market be willing to make the huge initial long-term investment (of some 70 years?) in nuclear power, rather than plump for cheaper, more reliable and less politically sensitive alternatives such as Combined Cycle Gas Turbines?

- Can a robust system be set up to ensure that private companies (rather than the taxpayer) will carry the huge costs of decommissioning nuclear plants many years down the line?

The last four points suggest that without price guarantees or some form of subsidy, the market itself will not buy into new nuclear power capacity (Sussex Energy Group 2006). It is worth recalling the experience of the Thatcher Government during the 1980s which ordered a new generation of ten new nuclear power stations (based on another 'energy gap' concern that proved inaccurate) but was only successful in getting one nuclear power station, Sizewell B, built.

With such questions unresolved, one does not have to be a green activist to question whether the Government has sufficient good information available to be confident about supporting the construction of new nuclear power stations.

Given the long 12-15 year lead time for any new nuclear power station – due to the need to obtain planning permission and the long construction time – any new nuclear power would be unlikely to contribute to filling the 2015-2020 'generation gap' or meeting the 2020 emission reduction target. As radical new energy policies will be needed to achieve these targets anyway, a wise Government would surely focus on the priorities set out in the 2003 Energy White paper: securing greater energy efficiency and massively expanding the renewables sector.

EU Emissions Trading Scheme (ETS)

The inclusion of the electricity supply industry within the ETS (which is discussed in greater detail in the next section on the business sector) should provide the electricity

industry with a financial incentive to cut emissions and, therefore, to invest in lower carbon forms of generation. For the second phase of the ETS (2008-12) the Government has set an overall cap within a range that would achieve annual emission reductions of between 3.0 and 8.0 MtC. It decided that all the emission reductions against 'business as usual' would be borne by the electricity supply industry, on the grounds that it can easily reduce carbon emissions in the short-term by switching from coal to gas, it is relatively insulated from international competition and, therefore, could pass on the costs of carbon to consumers (DTI 2006b: 35).

Both the Environmental Audit Commission (2007b: paras.69-79) and an independent audit (Maslin et al 2007: 16) have raised serious doubts about the likelihood of achieving carbon savings at the top end of the 3.0-8.0 MtC range, notably on the grounds that the predicted carbon savings for Phase 1 of the ETS were not achieved, uncertainty exists about how the ETS will operate beyond 2012 and the implication in DTI figures that the 8MtC represents a cut on 'business as usual' projections rather than 1990 levels.

Moreover, the ETS is still in its infancy and has experienced some teething problems with the price of carbon fluctuating wildly amidst accusations that several countries have been far too generous in allocating permits (See Box 3.2). As a consequence, the carbon price in the first half of 2007 fell as low as one €1, which means that with high gas prices it is cheaper for electricity generators to switch back to burning coal and pay for the resulting carbon emissions, than it is to burn gas.

Carbon Capture and Storage (CCS)

Given that fossil fuels, particularly coal, will continue to be used to generate electricity for many years ahead, there is a strong incentive to find ways of limiting the impact on climate change – indeed, as noted above the recent increases in UK emissions are largely down to the switch back to coal. There is a range of carbon abatement options, including clean coal technology and co-firing of fossil fuels with biomass (currently an eligible technology under the Renewables Obligation), but potentially the most radical is carbon capture and storage.

CCS is a new process, which many believe has the potential to play a significant role in reducing carbon emissions from fossil fuel combustion, particularly coal. Carbon is captured from the fossil fuel when it is burnt, and then transported to a site where it is stored underground in geological formations, which prevents it from entering the atmosphere. CCS may reduce carbon emissions from fossil fuel combustion in electricity generation by 80-90% relative to the same plant without CCS (DTI 2006b: para.5.71). The technologies employed in CCS are already widely used, although CCS is yet to be successfully demonstrated at a commercial scale, let alone adopted. As a result, many technical, regulatory, environmental, and economic uncertainties remain. The UK is in a strong position to assume a pioneering role in the development of CCS, as it has a large pool of expertise in the domestic oil and gas industries and the North Sea oil and gas fields form a potential reservoir for sequestering the carbon.[14] However, as the 2003

[14] The captured CO_2 could also be used to increase the recovery of remaining reserves of oil and gas by injecting it into existing reservoirs.

Energy White paper acknowledged, there is an urgent need to act fast to exploit the limited window of opportunity to use depleted North Sea oil fields before they are closed. Yet the Government has been tardy in promoting CCS. The EAC commented in 2006 that it was *'scandalous that so little progress in developing clean coal and CCS has been made'* (EAC 2006: para.53) apart from a handful of DTI reviews and documents.

The Government has recently introduced several measures to support the development of CCS. It has invested £35m under the Carbon Abatement Technology strategy in the development of CCS for use in the UK. Budget 2007 announced the launch of a DTI competition to proceed with the first British CCS demonstration. The Energy Review announced the formation of a CCS Regulatory Task Force and a North Sea Basin Task Force to investigate the regulatory measures required to enable the successful development of CCS, and a bilateral partnership with Norway to enable the development of CCS in the North Sea. The 2007 Energy White Paper includes several further exploratory initiatives, but predicts that it will deliver carbon emission reductions of only 0.25-1.0Mt per year by 2020 (HM Government 2007a: p.179).

However, assuming the technological and regulatory issues are resolved satisfactorily and reasonably quickly, there are further economic and environmental obstacles to the development of CCS:

- CCS will only take off if the price of carbon is high enough to make it economically attractive. With the price of carbon in the ETS fluctuating between under €1 and €4 per tonne in the first six months of 2007, the cost of saving CO_2 through CCS will need to drop dramatically from its currently estimated price of €30-45/tonne. As the technology is developed on a commercial basis this price is certain to fall, but widespread take-up will still depend on the ETS market price increasing and on the Government establishing a strong and unambiguous regulatory and financial framework (Maslin et al 2007: 16).

- There are reservations in environmental circles about the message that CCS sends out. If implemented widely, energy suppliers and the Government may draw the lesson that it is acceptable to continue burning non-renewable, carbon-emitting fossil fuels and that further changes to our carbon footprints are less urgent.

- There are also important uncertainties about the effectiveness of the underground capture of carbon. For example, concerns have been raised about the possibility of underground reservoirs becoming unstable and leaking unprecedented levels of carbon dioxide back into the atmosphere.

Nevertheless, whilst there is a danger that CCS might send out a 'business as usual' message, the reality is that coal is still a major source of electricity globally. CCS offers the opportunity for the UK to set an important example by using its own exploited oilfields to store carbon and also to export this technology to countries like China, where the equivalent of one new coal-fired power station is being opened every four days on average.

3.4.4. Summary: Energy Sector[15]

The Government's energy policy has fallen short of its climate change objectives on several fronts.

The Government did not commit itself firmly to renewable energy until the 2003 White Paper. Despite the longstanding problems that have held back this fledgling industry, the main supportive measure, the Renewables Obligation, was not introduced until 2002. Not surprisingly, the Government will miss the 2010 10% renewable energy target, and is by no means certain that the proposals in the 2007 White Paper will deliver the 2015 and 2020 targets. Despite its natural resources of wind and wave, the UK remains far behind many of its EU neighbours. In addition to greater support for a range of renewable energies, there is considerable scope for stronger measures to encourage CHP and micro-generation.

There is also a strong need for the Government's approach to energy policy and, specifically, encouraging low carbon energy solutions to consider the social and technical institutional and infrastructural systems within which energy is generated, supplied and used. Without a more holistic approach to understanding the nature of energy policy, a successful transition to a low carbon economy is highly unlikely to be achieved.

Even with the proposed reforms to the planning process that will fast-track major infrastructure projects, nuclear power will not contribute significantly to filling any possible energy generation gap or reducing emissions by 2020. It could contribute to the 2050 target but so many political, financial, environmental, ethical and security issues remain unresolved – a situation unchanged in the last 20 years – that the Government might be wiser to direct its efforts elsewhere.

The success of the EU ETS depends heavily on the price of carbon being sufficiently high to create a strong financial incentive for the electricity industry to switch to lower carbon sources of generation.

The Government has been slow to exploit the opportunities to develop CCS and thereby establish the UK as a pioneer in this process. The success of CCS is heavily dependent on the market price of carbon and on the Government establishing a strong supportive financial and regulatory framework. Despite various environmental objections, CCS could be an important long-term means of reducing carbon emissions both in the UK and in the industrialising world.

[15] There was insufficient room in this brief overview to cover in depth all relevant issues related to energy policy and climate change. See the forthcoming book from the Sussex Energy Group at the University of Sussex for a more comprehensive coverage of cutting edge thinking in this field (see www.sussex.ac.uk/sussexenergygroup).

3.5. Business

3.5.1. Context

In 2005 the business sector (excluding energy supply) was responsible for carbon dioxide emissions of 99 MtC, or about 18% of the UK total (DEFRA 2007b). Since 1990 GHG emissions from this sector have declined by about 28%, primarily in waste management and various industrial processes where there has been a significant reduction in emissions of:

- methane gas – due to the increased collection of landfill gas for energy recovery
- nitrous oxide – due to the introduction of abatement equipment in 1998 for adipic acid (used in production of nylon)
- Hydrofluorocarbons (HFCs) – due to the fitting of abatement equipment (although emissions are projected to rise again because it is used as a substitute for various ozone depleting gases).
  (DEFRA 2006a: 45)

The decline in the main business category, which accounts for over 70% of the emissions from the overall business sector, was only 4.0% between 1990 and 2004 (Maslin et al 2007: 18). Yet, according to the Carbon Trust, businesses waste 10-20% of the energy they buy through poor control of heating, air conditioning and ventilation, by leaving lights and appliances on (HM Government 2007a: para.2.4), which suggests that there are good financial incentives to improve energy efficiency.

The CCP 2006 predicted that overall emissions could fall further to 33% below baseline levels by 2010.

3.5.2. Government Policy - Overview

The Labour Government initially did little to reduce GHG emissions from the business sector. In 2000, the Royal Commission on Environmental Pollution identified six carbon reducing policies, of which only one – the Climate Change Levy – was introduced by Labour, but was not implemented until 2001 (Maslin et al 2007: 27).

The Climate Change Levy (CCL), along with its associated voluntary industry sector agreements, was an innovative market-based policy instrument. Together, they represent the majority of the emission reductions arising from Government measures currently predicted for this sector for 2010 and beyond.

The CCP 2000 also included two other important future measures:

- The Carbon Trust, established in April 2001, is an independent Government-funded company, which helps business and the public sector save energy, reduce carbon dioxide emissions and exploit the commercial potential of low carbon technologies.

- The UK Emissions Trading Scheme, launched in 2002 with £30m funding, was the first initiative of its kind, although it has since been absorbed into the EU ETS.

The launch of the EU ETS in 2005 has potentially far-reaching implications for the business sector, although as noted in 2.4.3 the decision that all UK emission reductions in its second phase (2008-12) should be concentrated on the electricity supply sector will inevitably limit its impact on the rest of the business sector in the medium term.

In addition to these main policy instruments, the Government has introduced some modest new measures and strengthened existing policies:

- Energy Efficiency Loan Scheme, 2002, a pilot loan scheme for small and medium sized enterprises (SMEs), funded by the Carbon Trust. It was allocated an extra £15m in 2005 to support its gradual roll-out across the SME sector.

- Building Regulations, 2002, 2005, a tightening of regulations to cover new boilers and windows.

- The CCP 2006 announced measures to encourage and assist SMEs to take up energy saving opportunities. Gordon Brown's 2007 budget included additional financial support for Business Links and the Regional Development Agencies to advise small businesses on environmental improvement, innovation and energy audits (up from £140m to £240m).

The 2006 Energy Review acknowledged the failure of enterprises in the non-energy intensive sectors to exploit opportunities to improve energy efficiency and recommended various stronger policy instruments. The 2007 Energy White Paper contained one significant new measure, a mandatory cap and trade scheme to be called the Carbon Reduction Commitment, and several more modest initiatives.

There are no specific emissions reduction or other climate change targets for the business sector.

3.5.3. Government Policy - Evaluation

This section will focus on the main policy instruments designed to reduce business emissions.

Climate Change Levy and Climate Change Agreements

The CCL is a tax on energy usage across business, commerce and services (but excluding the transport sector and small firms). When introduced it was accompanied by a 0.3% cut in employers' national insurance contributions and the rest of the proceeds were intended to be used through Enhanced Capital Allowances as subsidies to promote energy efficiency. In short, the CCL was a progressive attempt to tax an environmental 'bad' – energy usage – and to encourage a social 'good' – employment.

When Gordon Brown announced the CCL in March 1999 he was met by a barrage of criticisms from business, generally about its impact on competitiveness, but particularly from manufacturers who complained that they would be hit harder than services because they employed fewer people so they would receive a lower rebate.

The tax was also open to the environmental criticism, notably expressed by Friends of the Earth, that by failing to discriminate between forms of energy with different carbon contents, it did little to encourage switching to lower carbon energy sources. However, there are some exemptions, including energy from new renewable sources and good quality CHP.

There has been some debate about the effectiveness of the CCL in cutting emissions. DEFRA (2006a: 47) reports the findings of an independent evaluation by Cambridge Econometrics in 2005, which found that the CCL could deliver cumulative savings of 3.5 MtC/year – well above the 2 MtC estimated when it was launched. The main impact was a result of an initial announcement effect, with a smaller reduction in demand arising from the levy contributing to higher fuel prices. However, it was noted in the report that those savings *might* have occurred anyway in the absence of the Levy, notably because of the unusually warm winters in 2002 and 2003. The combination of cuts in energy demand and the National Insurance rebate are also predicted to reduce overall unit costs for business by 0.13% by 2010.

There has been criticism of Gordon Brown's reluctance to raise the level of CCL in the face of strong industry lobbying about the threat to competitiveness. The CCL rate was frozen from its introduction in 2001, until it was finally raised in line with inflation from April 2007, with a commitment to do so on a yearly basis. The timidity of Chancellor Brown was perhaps understandable in the face of the battering the Treasury received from the business community over CCL, but as a higher rate will certainly achieve more cuts in carbon, the six year freeze was a clear indicator that until very recently climate change was a low Treasury priority.

There have been a several Enhanced Capital Allowance (ECA) schemes, but there is little evidence that they have had – or are likely to have – any significant impact. One study by the Carbon Trust found the uptake of ECAs amounted to around £100m per year, which was lower than previous Treasury budgetary estimates. The Carbon Trust was unable to distinguish whether these ECAs had resulted in any efficiency savings in addition to what would have happened without them. Nor is there any great ambition invested in ECAs. For example, although the 2006 announcement of a proposed ECA to promote the cleanest biofuel production plants was welcomed by both British Sugar and the NFU, neither anticipated that it would have any significant impact, whilst DEFRA itself stated that the scheme was unlikely *'to result in an increase in the production of biofuels'* (EFRAC 2006: para.162).

When launching the CCL, the Treasury also announced that it would offer an 80% discount on the levy for industrial sectors that agreed to meet challenging voluntary targets for improving energy efficiency or reducing GHG emissions. These twelve-year

Climate Change Agreements (CCAs) are negotiated between DEFRA and the relevant trade association, with targets set for the entire sector and for each individual operator, and performance is monitored every two years. These agreements currently cover over 50 industrial sectors and run to 2013 (HM Government 2007a: para.2.16). Industry lobbying ensured that eligibility for CCAs was extended to energy-intensive sectors, even though the Treasury had previously stated that it was legally impossible (within EU state aid laws) to do so. As a result, several new sectoral agreements were negotiated.

The theoretical appeal of the industry voluntary agreement is that it allows industry the flexibility to find the most efficient way of reducing carbon emissions whilst minimising the costs of intervention for the Government. The challenge is to ensure that such agreements are sufficiently robust both in terms of setting challenging reduction targets and ensuring compliance.

In practice, the CCAs have proved very difficult to negotiate because reliable baseline energy consumption figures did not exist at the start of the process. For example, the first tranche of agreements involved 31 civil servants and 17 person years of their time (Jordan et al 2003: 193). Given the unreliability of the baseline data, it is not surprising that there has been some debate about the effectiveness of CCAs (EAC 2004a: para.74-6) One study of the first period claimed that emissions savings of 3.7 MtC had been achieved, some three times greater than predicted, yet the bulk of these savings came in the steel industry, which had suffered a huge fall in output during 2002 due to operational problems and structural changes. Nevertheless, DEFRA is understandably trenchant in its defence of CCAs (DEFRA 2006a: 49). The same Cambridge Econometrics report, whilst expressing reservations about the impact of the CCAs, suggests that they might have had an 'awareness effect' that went beyond what CCA targets might have achieved on their own. Certainly a recent independent audit accepts the projected 2.9 MtC annual savings (Maslin et al 2007: 29).

UK Emissions Trading Scheme (2002-2006)

The now defunct UK ETS was an innovative pilot scheme, which originated from a 1999 initiative by several industry associations to form an emissions trading group as an alternative to the unpopular Climate Change Levy. The start was delayed several times as details had to be ironed out, and the Government eventually had to find £215m as an incentive to draw businesses in (most of whom wanted to sell rather than buy permits). The 33 Direct Participants had to bid annual cumulative GHG reduction targets set against a 1998-2000 baseline, in return for a share of the incentive money.

The scheme delivered emissions reductions significantly in excess of planned reductions – the CCP 2006 reported over 1.6 MtC. As to be expected in such a pilot scheme, there were also several teething problems. Over half of the money was allocated to just four companies. The voluntary nature of the scheme meant that it attracted those businesses with greater potential to make low cost emissions reductions, but this led to an oversupply of allowances and a sharp fall in their price. The decision to make the new Carbon Reduction Commitment a mandatory cap and trade scheme suggests lessons have been learnt (see below).

EU Emissions Trading Scheme (2005-)

The UK Government regards the EU ETS as *'the cornerstone of the Government's policy framework to tackle climate change'* (EAC 2007b: para.1). Specifically, CCP 2006 states that it will be a central element of the business sector's contribution to meeting UK emission reduction targets. Yet, although the EU ETS covers some 1,000 UK installations, the Government's National Allocation Plan for Phase 2 of the scheme places the burden of emissions reductions against 'business as usual' entirely on the electricity generation sector (DEFRA 2006a: 51). In short, the ETS will have little if any impact on GHG emissions from the business sector before 2012.

The EU ETS clearly has the potential to play a significant role in encouraging emission reductions but not with current allocation of permits. The UK Government must take a leadership role in working with its EU partners to resolve the issues identified in Box 3.2, notably the over-supply of allowances, so that it can feel confident in setting a National Allocation Plan for Phase 3 that can really start to bite across the business sector. It should also encourage a much wider use of auctioning in the allocation of allowances and encourage tighter, centrally imposed caps.

Box 3.2: EU Emissions Trading Scheme

The EU ETS is the first international emissions trading scheme. It was launched in January 2005: Phase 1 runs to the end of 2007, phase 2 will be 2008-2012. The ETS sets a uniform price for carbon for GHG emissions from specific heavy industry activities across the EU member states. It is mandatory for all businesses to participate if they operate in the specified industrial sectors – notably energy generation, metal production, cement, bricks, pulp and paper. Each state decides through their National Allocation Plan on the quota – or cap - for each phase of the scheme and how they are to be distributed between companies, subject to approval by the European Commission. The cap must not exceed expected emission levels in the country and should be in line with Kyoto commitments. Companies must provide an annual report on their emissions, which is audited by a third party.

Phase 1 covers less than 40% of all EU25 GHG emissions. Most permits are allocated free to installations covered by the scheme (only 0.2% were auctioned). The total permit market over the three year period is worth around US $115b. Trading volumes have grown steadily. The price of carbon has fluctuated between €10 and €25 per tonne for most of the period, but plummeted to just €1 per tonne in the first quarter of 2007.

Early issues:

- The ETS has generated demand for emission reductions in less developed countries. EU-based industries have purchased carbon reductions through the Kyoto Clean Development Mechanism.

- Companies need long-term confidence in the future of the ETS beyond 2012 to allow sensible investment decisions.

- Imperfect information about the supply and demand of allowances meant that when the first data on actual emissions was released in April 2006 – 15 months after trading began- it prompted a sharp downward correction of prices.

- Scarcity in the market is difficult to achieve because the overall allocation is not set centrally but in each member state, allowing the potential for gaming on allocation levels. Total EU wide allocation in Phase 1 is estimated to be just 1% below projected 'business as usual' emissions.

- Robust administrative systems are essential. The allocation methods have placed considerable demands on companies to collect, verify and submit historical data on emissions. Costs were especially high for small firms.

Source: Stern (2007: 372-4). See also EAC (2007b).

Building Regulations 2002, 2005

In principle, tough building regulations should play a vital role in emissions reductions. Unfortunately, the current regulations apply primarily to new build, which amounts to around 1-2% of total UK stock, although there are stricter regulations now on refurbishments. A further problem is that compliance with the regulations is believed to be very poor and enforcement is erratic at best (Carbon Trust 2005: 31-4).

2007 Energy White Paper

After the 2006 Energy Review, DEFRA launched a consultation processes on an Energy Performance Commitment, which would be a mandatory cap-and-trade scheme for all enterprises with energy bills greater than 3000MWh (or £250,000).

The White Paper announced a proposed mandatory cap and trade scheme, renamed the Carbon Reduction Commitment (CRC). However, 'to minimise administrative costs' it will focus initially on large non-energy intensive organisations with energy bills greater than 6000MWh (or around £500,000). It will not target emissions covered either by CCAs or the EU ETS. CRC allowances will be auctioned, energy use and emissions will be self-certified, backed by an independent audit regime. Details will be finalised after a further process of consultation (HM Government 2007a: paras.2.18-28).

Other initiatives in the White Paper include measures to improve information, such as consulting on both a requirement to display Energy Performance Certificates in business premises and whether to extend the requirement to fit advanced/smart meters (e.g. that read energy use half-hourly) from large users of energy to all but the smallest business users.

3.5.4. Summary: Business Sector

There are very few measures to reduce GHG emissions in the business sector. Apart from the Climate Change Levy and Climate Change Agreements, the advisory and promotional work of the Carbon Trust is the only current measure forecast to have any sizeable impact on reducing emissions. The CCP 2006 contained no new measures of any significance.

The Climate Change Levy and Climate Change Agreements, whilst not perfect in design or execution, do seem to have encouraged some businesses to cut their carbon emissions.

Yet the CCL/CCA package only scratches the surface of the problem. Since 1990 the bulk of carbon emission reductions have come from GHG emission reductions in the waste management and industrial processes categories, with very little in the mainstream business sector. The sustained economic growth over the last ten years has meant that the CCL/CCA package is doing little more than counter-balancing the expansion of the business sector – a situation that is unlikely to alter up to 2020 with current forecasts for further economic growth (Maslin et al 2007: 18).

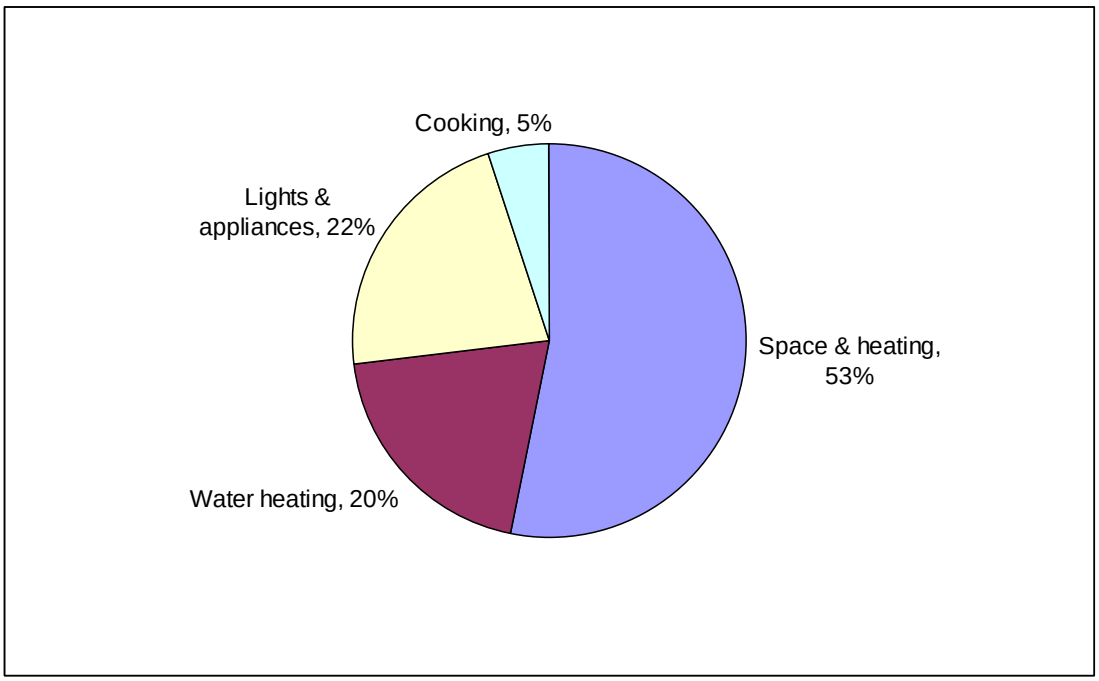
A Carbon Trust (2005) report states that the CCL/CCA package does not provide sufficient incentive to encourage emission reductions in the less energy intensive sectors

of the economy, where energy costs are a smaller proportion of costs. The new mandatory Carbon Reduction Commitment should make a real difference here, with the White Paper forecasting it will deliver 1.0 MtC in carbon reductions by 2020. Unfortunately, the decision to apply the CRC only to the largest organisations means that small to medium sized less energy intensive businesses are still not subject to any significant Government measures to reduce energy usage.

3.6. Domestic Sector

In 2005 the domestic sector was responsible for carbon dioxide emissions of 83 $MtCO_2$, or about 15% of the UK total (DEFRA 2007b).

Figure 3.4:
Domestic Carbon Emissions by End Use in 2003 (excludes emissions from transport)



Source: DEFRA (2006a)

Figure 3.4 shows the breakdown of household carbon emissions, indicating that 75% is consumed in heating, lighting and the use of appliances, where there is huge scope for savings. Several studies have demonstrated that investments in energy efficiency are more cost-effective, in terms of reducing carbon emissions, than any form of investment in low-carbon generation (PIU 2002; EAC 2006a: para.31). Another good reason to take tough action in this sector is that reducing household energy usage not only reduces carbon emissions but can also deliver important social and economic benefits by cutting energy costs for the poorest groups in society (notably pensioners) for whom household bills form a disproportionately large part of their outgoings.

3.6.1. Context - Low Hanging Fruits

Any sensible energy efficiency strategy for the domestic sector, where the challenge is to change the behaviour of consumers in their homes, will employ a range of policy instruments: regulations, financial incentives, provision of information and voluntary agreements with retailers and manufacturers. Significantly, although several energy efficiency measures are cost-effective and very quickly pay for themselves, consumer demand for them remains low, indicating the potential for emissions cuts in this sector. Reference is often made to the 'low hanging fruits' in the domestic sector – the availability of quick and easy policy measures that could have a rapid impact on household emissions. For example, there are around 500 million lights in the UK of which only 30 million are fitted with low energy bulbs. Around eight million homes could still benefit from fitting cavity wall insulation, which pays for itself within three years (HM Government 2007a: para.2.36).

However, a major challenge is that Government policies to encourage domestic energy efficiency are inevitably fighting against underlying trends that are increasing the demand for electricity, which is rising by about 1.5% each year. Economic growth and technological developments mean consumers have more disposable income to spend on an increasing array of electronic appliances – computers, plasma televisions, digital set-top boxes, halogen lighting - which tend to be heavy in their use of electricity.

It should be noted that there have been strong criticisms of the way the Government measures energy efficiency savings against 'business-as-usual' projections (House of Lords Science and Technology Committee 2005: para.12.4-12.15; EAC 2006: para.33). In particular, the baseline against which savings are estimated is very unclear

3.6.2. Government Policy - Outline

The Labour Government has been very slow to recognise the importance of the domestic sector. Indeed, one of its first acts was to fulfil Labour's 1997 election commitment to cut VAT on fuel used for home heating from 8% to 5%, which inevitably resulted in *increased* carbon emissions from the domestic sector.

Subsequently, the Government only very slowly expanded the rather thin package of energy efficiency measures it inherited from its predecessor (See Box 3.3). Although the CCP 2000 outlined several initiatives, the two measures predicted to have the greatest impact on carbon emissions - a new Energy Efficiency Commitment and improvements to the energy efficiency requirements of the Building Regulations – were not in place until 2002.

The importance of energy efficiency as a policy goal was given a major boost by the 2003 Energy White Paper, which made energy efficiency and the expansion of renewable energy the twin planks of its carbon emission reduction strategy. Yet, two years later, the lack of action prompted the Environment, Food and Rural Affairs Committee to conclude that *'the Government is failing to get to grips with encouraging energy efficiency at the household level'* (EFRAC 2005b: p.3). The CCP 2006 outlined further measures,

including more revisions to the Buildings Regulations, the extension of the EEC and a proposed Code for Sustainable Homes.

There have been several initiatives since then. Perhaps the most eye-catching was the announcement in the November 2006 Pre-Budget of an aspiration that all new homes should be carbon neutral by 2016, followed up in May 2007 by Gordon Brown's promise to build five new eco-towns. The 2007 Energy White Paper announced a reform of the Energy Efficiency Commitment, which will be renamed the Carbon Emission Reduction Target (CERT) in 2008, and a commitment to maintain some form of supplier obligation to deliver carbon savings from the domestic sector until at least 2020. Other measures include Energy Performance Certificates for homes, improved metering and efforts to increase the energy efficiency of products and services.

Box 3.3: Domestic Sector Emissions Reduction Measures

Energy Efficiency Commitment (Phases 1-2)/ Carbon Emission Reduction Target
Warm Front (England) and devolved administration equivalents
Building Regulations, 2002, 2005
Appliance standards and labelling (e.g.Market Transformation Programme)
Community Heating
Energy Performance of Buildings Directive
Code for Sustainable Homes
Improvements to Billing and Metering
Products Policy (consumer information, standards for lights & other EUPs)
All new homes to be carbon-neutral by 2016 (to be confirmed)

Measures announced in 2007 Energy White Paper (HM Government 2007a)

3.6.3. Government Policy - Evaluation

This section evaluates the Government's main carbon-reducing measures in the domestic sector.

Energy Efficiency Commitment (EEC)/Carbon Emission Reduction Target (CERT)

The EEC, introduced in 2002, requires suppliers to achieve targets for the promotion of energy efficiency improvements, focused on helping those households receiving income-related benefits and tax credits. Suppliers are given the flexibility to achieve these targets by any combination of approved measures, including installing insulation and supplying or promoting low energy light bulbs.

One problem is that a major emphasis in the EEC is on installing cavity wall insulation. Although it is a laudable aim, the Energy Savings Trust has argued that the scale of the planned installations is far above what can *practically* be achieved (EAC 2004a: para.65). Specifically, the Phase 2 target of at least 600,000 insulation installations per year compares with a record maximum of 400,000 in a year. Another weakness is that energy savings are calculated in terms of outputs (e.g. number of loft installations) rather than outcomes (reduction in energy demand) (EAC 2006a: para.38). Finally, another design

flaw is that rather than encourage whole-house improvements, the private energy companies have the incentive to fit only the single measure most rewarded by the regulator Ofgem – namely low energy light bulbs in Phase 1 and cavity walls in Phase 2.

The renaming of the EEC as the CERT, effectively replacing EEC Phase 2 to run from 2008-11, uses the same framework but with an expanded range of measures, including microgeneration and behavioural measures (HM Government 2007a: 2.42). The carbon target on energy suppliers is to be doubled, which it is hoped should encourage them both to increase their activity in existing markets such as insulation and to expand into new markets such as microgeneration. Thus some of the problems associated with the first two phases of the EEC have been addressed, although it is too early to judge how effective the new measures will be.

The Government's long-term aim is to change the way the supplier views the relationship with the end consumer: *'Rather than selling units of energy, the suppliers' focus needs to shift to the marketing of energy services'* (HM Government 2007a: para.2.48). The commitment to a continued Supplier Obligation beyond the end of CERT in 2011 could provide some long-term market stability to encourage this complex and ambitious transformation of energy suppliers, but there will probably need to be far stronger regulations and financial incentives in place to deliver what the Government itself acknowledges is a 'challenging' aim.

New Building Regulations

There have been several revisions to the Building Regulations. Builders have to calculate the energy efficiency of all new homes using the Government's standard assessment procedure and inform purchasers of the score. Since 2005, new or replacement boilers must be efficient condensing boilers. However, proposals for tougher regulations were watered down and UK standards remain well below the best European standards (House of Lords Science and Technology Committee 2005: 12.27).

There is no doubt that Building Regulations have helped improve the energy efficiency of new houses in recent years, but there remain major shortcomings in this area (House of Lords Science and Technology Committee 2005: 12.30-35). DEFRA (2006a: 80) concedes that there is a major problem ensuring compliance with the regulations, and it has launched training programmes to address this problem. Furthermore, new houses make up a small percentage of the total housing stock, so the new regulations simply do not apply to the vast majority of houses. As demolition rates run at about 0.1% per annum, around 24 million of the approximately 25 million properties standing today, will still be standing in 2050 (House of Lords Science and Technology Committee 2005: para.7.1).

The Energy White Paper envisages further changes to the Building Regulations setting interim targets for improvements in energy performance of new homes – 25% better than the current Regulations by 2010 rising to 44% by 2013 – en route to the ideal of zero carbon new homes by a date to be fixed later in 2007. A new six star Code for Sustainable Homes was published in December 2006 to provide a single national

standard for the design and construction of homes, and all new homes may be required to by rated on this Code.

Tackling Fuel Poverty

A household is considered to be in fuel poverty if to maintain a satisfactory heat regime it spends more than 10% of its income on fuel use. In 2003, there were around two million households in fuel poverty (down from 6.5 million in 1996), but this figure was predicted to have risen by another million by 2006 due to increased fuel prices. Its underlying causes are a combination of poorly insulated, energy inefficient houses and low income (DEFRA 2006a: 87).

Warm Front and other related programmes target households in fuel poverty by providing a range of heating and insulation measures. Over 1.1 million households received aid between 2000 and 2005 (Maslin et al 2007: 51). Whilst these programmes can be very helpful, increases in fuel costs can quickly wipe out many of the benefits. Nevertheless, increased public expenditure on this programme should be regarded as a priority: it is a win-win policy that reduces carbon emissions whilst helping some of the poorest groups in society.

Appliance Standards and Labelling

There have been several initiatives to improve the energy efficiency of products. The Market Transformation Programme works with industry through voluntary agreements to encourage energy efficiency improvements in products, including labelling schemes. Budget 2006 announced a partnership between the Energy Saving Trust and major retailers to introduce voluntary schemes to encourage the purchase of more energy efficient consumer electronic products. But the overall picture remains very patchy. Energy efficiency standards are still unavailable for many forms of IT (PCs, laptops etc) and audiovisual equipment (televisions, DVD players etc) – at a time when the demand for large screen televisions, LCD and plasma screens is booming.

The implementation of the EU Eco-Design of Energy Using Products directive in 2008 will help by providing a formal mechanism for establishing product standards, primarily by voluntary means but with the possibility of setting mandatory energy and eco-design standards for energy-using products.

The 2007 Energy White Paper suggests that more effort is being directed in this area. It declares that the Government will press in the EU for the rapid delivery of mandatory measures to improve energy efficiency, reduce stand-by power and improve lighting standards (HM Government 2007a: para.2.99). At the domestic level, the White Paper expresses the aspiration that current negotiations with UK manufacturers, retailers and trade associations will enable the UK to be the first country in Europe to phase out inefficient GLS lightbulbs (Ibid: para.2.100). The Market Transformation Programme will be used to publish a series of consultation papers – starting with consumer electronics – setting out how energy performance of products must improve over the next 10-20 years. It is not yet clear what real impact these voluntary efforts will have.

3.6.4. Summary: Domestic Sector

Government policy in the domestic sector consists of a modest set of measures that together, notwithstanding the measures announced in the 2007 White Paper, fall well short of what is necessary to deliver serious emission reductions in this sector.

The Government has been very slow to recognise the importance of the domestic sector. Its main emission reduction policies – the Energy Efficiency Commitment and Building Regulation reforms – were not even introduced until 2002. Although the 2003 Energy White Paper acknowledged the strategic importance of improving energy efficiency, there have since been few significant policy developments. The CCP 2006 contained no more than a handful of initiatives that will at best deliver just over 1 MtC of emissions reductions by 2010.

The current programme of measures is unlikely to deliver even the limited cuts predicted in CCP 2006 for 2010. A recent independent audit of the pre-White Paper policies suggested that far from achieving the reductions predicted in the 2006 Energy Review of 11.3 MtC by 2020, cuts will actually reach only 2.2 to 4.2 MtC (Maslin et al 2007: 3). New measures announced in the Energy White Paper should improve the chances of reaching the 2020 target, but it is too early to be confident in the Government's forecasts. The fear of a shortfall is partly informed by the repeated failure of previous targets - several predicted reductions in the CCP 2000 had to be adjusted downwards. Certainly some current targets (e.g. the number of cavity wall installations) are simply unrealistic and there is a wider compliance problem, notably with the implementation of the building regulations (which makes the aim that all new homes should be carbon neutral seem very optimistic). Predictions for product improvements based voluntary agreements with manufacturers that are yet to be negotiated also seem a rather flimsy basis for accurate forecasting. Indeed, too many policies in this sector are either voluntary or are unenforceable by legal sanction, which makes implementation difficult to achieve.

Even if current polices were to deliver predicted reductions, there would still be a need for a more stringent programme. The Sustainable Development Commission has commented that there needs to be *'a step change in householder engagement on energy and climate change issues'* (SDC 2006: para.50). Yet this EAC assessment of the Government's approach to energy efficiency indicates how much more needs to be done:

What is abundantly clear is that it will require a coordinated package of regulatory and fiscal policy instruments which offers much more in the way of both carrots and sticks, and that this must be accompanied by high-profile campaigns to raise awareness among the public. Far greater political leadership is required and far higher priority accorded to energy efficiency if the Government is to achieve the carbon reductions set out in the Energy White Paper. (EAC 2006a: para.40).

Perhaps the primary explanation for the slow progress on energy efficiency is that the Government has mistakenly regarded it as a no-cost option, whereas an effective approach requires significant up-front expenditure (EAC 2006a: para.39). Compare the tiny expenditure in the UK to that of Germany, where around €1.5 billion each year in

grants is now available for fitting domestic energy equipment (Warren 2006). Alternatively, France has a long-standing system of tax incentives for spending on energy-saving devices.

As Box 3.4 indicates, there is no shortage of ideas for further initiatives, but despite considering most of these suggestions, the Treasury has so far rejected them.

There are signs that the Government is listening to the clamour of voices calling for tougher action, as illustrated by some of the measures in the 2007 Energy White Paper. In addition, the 2007 budget introduced new grants of £300-4,000 for pensioners installing insulation and central heating, and declared all new zero-carbon homes up to £500,000 exempt from stamp duty until 2012. Gordon Brown also announced that he had been encouraging financial institutions to offer special mortgages for energy efficient upgrades in homes and was lobbying EU finance ministers to approve an EU-wide reduction of VAT from 17.5% to 5% on energy-saving and environmentally friendly products in the home. These are steps in the right direction but much more needs to be done

Box 3.4: Three Possible Energy Efficiency Policies

The Energy Savings Trust has argued that the *'single most important fiscal change needed'* is a reduction in stamp duty on houses as a financial incentive to undertake energy efficiency improvements in the home. Although only around 900,000 homes are sold each year, this measure could still have a significant impact. (EFRAC 2005b: paras.104-5).

For non-movers, council tax discounts could provide an incentive. Since 2004, Braintree District Council, working with British Gas, gives council tax rebates in exchange for implementing energy efficiency measures. It is very successful, with a high take-up rate, This scheme is now being tested in several other local authorities, but to have a significant impact it would need to be rolled out nationally with Government support. According to one study, assuming a take-up rate of 8% amongst eligible households, this would cost the Government £100 million a year and save 9.8 MtC over the lifetime of the measures. (Green Alliance 2006).

In Germany, Chancellor Merkel has introduced an 'Investing to Save' programme designed to bring all pre-1978 homes up to contemporary energy standards. Each year 5% of such housing will be refurbished so that by 2025 the entire German building stock should be of a high standard of energy efficiency. The programme budget of €1.5 billion per year provides direct subsidies to householders as a direct inducement to fit energy saving equipment.

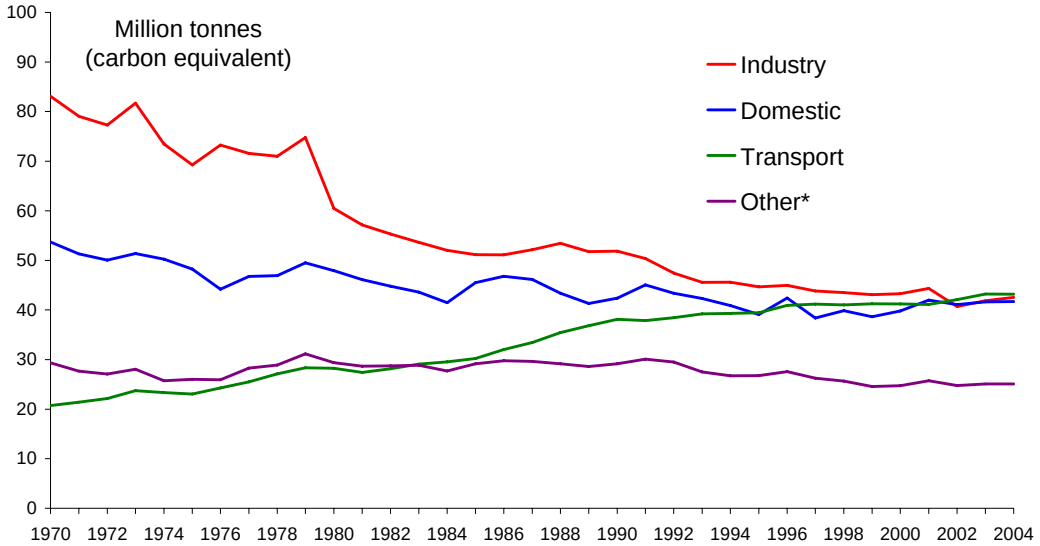
3.7. Transport

3.7.1. Context

Carbon dioxide emissions from transport are rising faster than from any other sector (see Figure 3.5) and are likely to become the largest source of UK emissions in the near future. In 2005 the transport sector was responsible for carbon dioxide emissions of 120 MtCe, or about 22% of the UK total by source (DEFRA 2007b) or just over a quarter by end user. Around 93% of carbon emissions in this sector are currently from road transport (HM Government 2007a: para.7.1).

It is particularly challenging to reduce carbon emissions from transport because of its oil dependency: 99% of all UK transport use oil products and transport accounts for 74% of UK oil consumption (EAC 2006b: para.4). Unlike electricity generation there are few commercially viable alternatives to fossil fuels, especially in aviation. As about 95% of all goods arrive in the shops using oil, it is very difficult to decouple the carbon emissions caused by transport from economic growth. Thus the continued economic growth and rising prosperity of recent years have driven transport emissions inexorably upwards. It is the only economic sector where carbon emissions by end user were higher (10%) in 2004 than in the 1990 baseline – and the only sector where they are projected to be higher – about 31% of total emissions - in 2020 than in 1990.

Figure 3.5: UK Carbon Dioxide Emissions By End User: 1970-2004



* Mainly commercial and public sectors

Source: Netcen - available at http://www.defra.gov.uk/environment/statistics/globatmos/kf/gakf07.htm

Road transport carbon emissions by source grew by 8% between 1990 and 2000, even though the average new car fuel efficiency has improved by 10% since 1997, and they are predicted to rise by another 8% between 2000 and 2010 (DEFRA 2006a: 61). The CCP

2006 anticipates that by 2010 Government policies will do no more than hold emissions levels steady.

International aviation and shipping are not included in the Kyoto Protocol, but when they are included in national emissions inventories the situation worsens sharply. International aviation is by far the fastest growing source of emissions by source (EAC 2006b: figure 3). Carbon emissions from international flights departing from the UK rose 111% between 1990 and 2004, and were equivalent to 5% of total UK carbon emissions, even without factoring in the radiative forcing of GHGs released at altitude. With the inclusion of international aviation and shipping in the transport sector, it accounts for 33% of total UK emissions (EAC 2006b: para.12). This is set to grow further because of the almost unconstrained growth in flying. The 2003 Aviation White Paper (DfT 2003) anticipates that air passenger movements will increase from about 200 million in 2003 to about 470 million in 2030, which will double the carbon emissions from aviation between 2000 and 2030 (Cairns and Newson 2006: 4)

It is little surprise that Tony Blair wrote to Douglas Alexander on his appointment as Secretary of State for Transport in May 2006 that *'in particular transport will be critical to our long-term goal of reducing carbon emissions'* (EAC 2006b: para.2).

But there are serious technical and political challenges to overcome. The major oil producers and car manufacturers are investing money and effort in trying to design commercial low carbon alternatives to the internal combustion engine. Despite the recent feverish discussion of road pricing, designers are still several years away from having a robust technology in place. And how can people be persuaded (or forced?) to change their behaviour – to switch from cars and planes to trains, buses or bicycles – when those alternatives:

- may not be available
- when available, they may be unreliable or infrequent (especially in rural areas)
- dangerous (poor cycle facilities)
- expensive (particularly if people already own a car)

Or, when such pressure to change may offend the strong sense of personal freedom that seems to be expressed by driving or flying?

It is important also to recognise that transport policy has several aims, only one of which is climate change. In particular, the traditional approach in UK road transport policy has been 'predict and provide' - predict the growth in road traffic and build the roads for them to travel on. The Conservative Government's 1989 White Paper, 'Roads to Prosperity', which promised a massive programme of road building, explicitly linked the increase in road transport to economic growth. Thus climate change is both a relatively new transport policy objective and one that implies a transformation of the traditional transport policy paradigm away from 'predict and provide'.

3.7.2. Government Policy - Outline

Labour entered office with great optimism about its ability to deliver radical reform of transport. The key word was 'integration': the goal was an integrated transport policy. Indeed, the marriage of the transport and environment briefs in the Department of Environment, Transport and the Regions (DETR), under Deputy Prime Minister John Prescott, was a visible indicator of its pursuit of 'joined-up government' in the areas of transport, land-use and the environment. Prescott famously declared that *'I will have failed if, in five years time, there are not many more people using public transport and far fewer journeys by car. It's a tall order, but I urge you to hold me to it'* (*The Guardian* 6 June 1997).

The 1998 White Paper, 'A New Deal for Transport', reflected a paradigm change in thinking about transport policy. Preventing climate change - specifically meeting the Kyoto targets - was identified as a major objective of transport policy. Labour challenged the 'predict and provide' philosophy by acknowledging that it was impossible to build our way out of congestion on the roads. There was some new money for public transport, but little for road building. Although talk of slowing the growth of road transport was not backed up by national road traffic reduction targets, the stick was to make motoring more expensive, with local authorities given new powers on charging for congestion and workplace parking.

Yet Blair delayed on finding time for transport legislation and by the time the White Paper became 'Transport 2010: the Ten Year Plan', many of the more innovative ideas had disappeared. Moreover, the focus was on reducing congestion and local pollution, rather than directly on climate change. Prescott did reasonably well out of the Comprehensive Spending Review: there was £180 billion promised for investment in rail, roads and local transport over that period (£60 billion in each) – a sizeable increase for rail and with considerable responsibility allocated to the local level. But money was also to be spent on new road building – 100 new by-passes and 360 miles of trunk road and motorway widening - not just improving existing infrastructure.

Unfortunately, the strategy quickly came apart at the seams. Fatal rail crashes at Southall, Ladbroke Grove and Hatfield exposed the failings of the complex regulatory structure separating Railtrack, with responsibility for the track, and the 25 train operators, and also revealed the long-term lack of investment under the Conservatives as the railway industry was being prepared for privatisation. The railway industry now experienced several years of political crisis and organisational upheaval that saw Railtrack effectively renationalised in 2001, and eventually control over the tracks was returned to the Department for Transport.

Meanwhile, despite the rhetoric of persuading people to leave their cars for public transport, the Government was unwilling to increase the costs of motoring significantly. Indeed, after the fuel protests of Autumn 2000, which temporarily brought Britain to a standstill, the Government was terrified of upsetting this powerful lobby. Gordon Brown had already dropped the fuel price escalator a few months earlier; in Pre-Budget 2000 he offered further solace to the protesters in the form of tax concessions to road hauliers.

Subsequently, he repeatedly delayed or abandoned fuel duty increases at the slightest hint of public unease. Five years after Prescott's pledge to reduce road traffic, the real costs of motoring had gone down whilst road traffic continued to rise inexorably.

The CCP 2000 reflected the low priority of climate change concerns in the transport sector. The main emission reduction measures were the EU-level voluntary agreement with car manufacturers and the fuel price escalator that had been inherited from the Conservatives but had already been dropped a year earlier. Further GHG reductions were predicted to arise as an indirect benefit of the package of measures, such as efforts to shift passengers and freight from road to rail, contained in the 10 Year Plan.

London has become a rare beacon of hope, demonstrating that transport could and should be integrated. Ken Livingstone's congestion charge introduced in 2003 proved a remarkable success (albeit not immune from criticism). Congestion fell significantly: by an average 30%, with an 18% reduction in traffic (Transport for London 2005: 2-3). Investment in new buses and better traffic management saw the numbers travelling by bus in particular increase significantly. Having initially stayed aloof, the Government was soon keen to embrace the scheme.

Some semblance of direction and order to the transport strategy returned with the 2004 *Future of Transport* White Paper, although climate change was still battling unsuccessfully to compete with other DfT priorities, notably congestion and economic productivity. For cars, the need to address congestion rather than climate change was regarded as paramount. Thus the creation of a Transport Innovation Fund (TIF), to be the single largest source of public investment in transport, was intended to direct resources towards two priority objectives: tackling congestion and improving productivity, with little prospect of many of these schemes preventing climate change (EAC 2006b: para.29-30). At least with roads there was some recognition (albeit little action) of the need to encourage people out of their cars and on to buses and trains. There was even talk of a national road-pricing scheme – some 15 years down the line. But the 2003 Aviation White Paper was based on an unreconstructed 'predict and provide' approach to airport expansion, albeit coupled with a vague promise that *'over time aviation meet its external costs'* (DfT 2003).

Despite the continued growth in carbon emissions from the transport sector, the CCP 2006 contained only one additional substantive policy measure – the Renewable Transport Fuel Obligation, announced in 2005, but not due to be introduced until 2008.

Table 3.3: Key Transport Measures in the CCP 2000 and CCP 2006

Existing measures (CCP 2000)	**Carbon savings in 2010 (MtC)**
EU voluntary agreement with car manufacturers, plus graduated VED and reform of company car tax	2.3
Wider transport measures	0.8
Sustainable distribution in Scotland	0.1
Fuel duty escalator	1.9
Total	5.1
Additional measures (CCP 2006)	
Renewable Transport Fuel Obligation	1.6
Future EU voluntary agreement with car manufacturers	0.1
Total	1.7

Source: DEFRA (2006a: 62-3)

The Eddington Report, published in December 2006, had been commissioned jointly by the DfT and the Treasury to examine the links between transport and the UK's productivity, growth and stability. There were suspicions amongst environmentalists that the underlying agenda was to justify new road building, and the report certainly highlighted the costs of congestion: a 5% reduction in business road travel time could release savings of £2.5 billion, equivalent to 0.2% of GDP (Eddington 2006: 5). But Eddington also came out with some strong recommendations regarding climate change. He argued forcefully that all parts of the transport sector – including aviation – should pay their full external environmental costs. Reflecting the findings of the Stern Report (Stern had advised him), Eddington argued that road pricing was essential; indeed, in a speech launching the report, he described the case for road pricing to be an *'economic no-brainer'* (HM Treasury 2006a). Although this further strengthened the intellectual case for road pricing within Government, the publicity given to an anti-road pricing petition on the 10 Downing Street website that attracted almost two million supporters in early 2007 showed that the political case still needs to be won with the wider public.

In the last few months there has been a flurry of activity from the Treasury. In his pre-Budget in November 2006, Gordon Brown doubled Airline Passenger Duty and, for only the second time since 2000, he raised fuel duty in line with inflation. Having introduced a new top band for the biggest gas-guzzlers in 2006, in Budget 2007 Gordon Brown raised it 30% to £300, to increase to £400 in 2008, along with other minor adjustments to the rates of other bands. He extended to 2010 the biofuel duty differential worth 20p per litre. Significantly, he raised fuel duty above the rate of inflation – effectively a return of the fuel duty escalator - but promptly delayed the increase for six months.

Brown also announced the King Review, launched on 3 April, to examine the vehicle and fuel technologies that, over the next 25 years, could help to decarbonise transport, particularly cars.

3.7.3. Government Policy on Road Transport - Evaluation

In 2004 road transport contributed around 95% of domestic transport emissions, the same percentage as in 1990, with cars responsible for over 60% and most of the rest from lorries and vans. The DfT's carbon reduction policies are therefore focused on road transport, particularly cars. Three of its four carbon reduction priorities – reducing the fossil fuel content of transport fuel, increasing vehicle efficiency and encouraging consumers to use more environmentally friendly forms of transport – and its three main policy measures – the Voluntary Agreement package, the Renewable Transport Fuel Obligation and the fuel duty escalator – are all directed here (EAC 2006b: para.35).

Voluntary Agreement Package

The voluntary agreement package, the main plank of the Government's emission reduction policy, consists of four elements:

a) EU Voluntary Agreements

The EU voluntary agreement with car manufacturers (drawn up in 1998-9) was the main carbon emission reduction measure in both CCP 2000 and CCP 2006, despite strong evidence by 2006 that it was falling far short of its target. The objective of the agreement was to reduce average new car CO_2 emissions to 140g/km by 2008-09, primarily through technological developments. Emissions have come down – around 11% since 1997 - but in 2006 the average for new cars stood at around 167g/km. On current trends, it is likely to fall to around 164g/km by 2008, with the target figure likely to be met sometime around 2022 (Maslin et al 2007: 37).

The projected reduction of 4.0 MtC included in CCP 2000 was based on the 140g/km target being met by 2008, so the figure was adjusted downwards in CCP 2006 to 2.3 MtC, on the assumption that the average for new cars will be 162g/km in 2008. It is a more realistic, albeit still slightly optimistic, forecast. Certain market trends have slowed progress towards the target, notably the popularity for Sports Utility Vehicles, which are heavier and less fuel efficient than other cars, and the widespread fitting of air conditioning, which can increase fuel use by up to 25%.

Moreover, the emissions reductions that have occurred are not primarily due to technological innovation by car manufacturers, but are a result of the shift to diesel engines in the UK car fleet. In 2006, 38.3% of new cars were diesel, compared to 16.2% in 1997. Yet the UK still lags behind most other EU countries, where on average around 50% of new cars in 2005 were diesel (Maslin et al 2007: 37). One reason for this difference is that in many EU countries fuel duty on diesel is lower than on petrol, unlike the UK. Given the slow progress towards the 140g/km target, there appears to be a strong climate change case for creating an incentive to purchase diesel cars by making fuel duty on diesel lower than on petrol, although there are other pollution concerns related to the high levels of NO_X and particulates emitted by diesel engines (EAC 2006b: para.47).

There is considerable debate within EU policy-making circles about how to remedy the situation. The Environment Commissioner, Stavros Dimas, wanted to impose a binding requirement that the average emissions for new cars sold in the EU falls to 120g/km by

2012, but he met fierce opposition from Industry Commissioner Verheugen, who was strongly lobbied by the German car manufacturers. Eventually, in February 2007 they agreed a compromise proposal to impose a 130g/km limit by 2012 (*The Guardian*, 8 February 2007), although this proposal still has to be formally adopted.

b) Company Car Tax Reforms

Company cars accounted for 56% of the UK new car market in 2006. Company Car Tax (CCT) has been based on carbon emissions since 2002, which has clearly contributed to the increase in diesel cars since 2002 (HM Revenue and Customs 2006: 14). Moreover, the CCT reforms have led to people choosing smaller, more fuel efficient, company cars. In 2001, new company cars emitted over 2g/km more than new private cars; by 2005 this had reversed, with new company cars emitting some 5g/km less than private cars (EAC 2006b: para.48). It is estimated that the reduction in company car emissions will have delivered total net savings of 0.35-0.65 MtC by 2010. In short, the CCT reforms have been a successful carbon reduction measure.

c) Vehicle Excise Duty Reforms

The reform of Vehicle Excise Duty (VED) in 2001 involved the replacement of a flat rate tax with a graduated system based on the carbon emissions of the vehicle. This measure was widely praised at the time as it represented the first vehicle tax in Europe to be based specifically on CO_2 emissions. Subsequently, however, the Treasury has been repeatedly criticised for its failure to increase the differentials between each band. Even after it introduced a new top band in 2006, the VED paid by the highest polluting SUVs and luxury saloons (>225g/km) was only £110 more than standard small hatchbacks in Band C (121-150g/km). In short, VED offered little incentive to purchase a lower carbon vehicle, as £110 is typically less than two full tanks of petrol for many SUVs.

The SDC commissioned a report in 2005 that recommended a £300 gap between each of the then six bands, ranging between £0-£1,800 (SDC 2006: para.81). Even the DfT's own research suggested that band differentials of £150 were needed to persuade 55% of consumers to switch to a lower carbon model

Gordon Brown did increase the rate for the new top band in Budget 2007 by 30% to £300, rising to £400 in 2008, along with modest increases and modifications to the other bands. However, the small differentials of £30-£40 in the other most popular bands will continue to limit the effectiveness of VED as a carbon reduction measure.

d) Car Efficiency Labels

The DfT has worked with the Low Carbon vehicle partnership and the motor industry to introduce colour coded efficiency vehicles for cars, rather like those used for electrical goods, based on the VED bands. These are available in car showrooms to enable consumers purchasing a car to make *'informed choices, reflecting the benefits that lower emissions vehicles bring'* (DEFRA 2006a: 67).

The Ten Year Plan

It is very difficult to assess the impact on carbon emissions of the package of measures outlined in the *Ten Year Plan* (DETR 2000b) because so many of the assumptions on which they are based have proved inaccurate – some too conservative, others too optimistic. One particular omission from current plans is that the increased emissions resulting from the plans for road building and widening contained in the *Ten Year Plan* and the 2004 *Future of Transport* White Paper (DfT 2004) have either been underestimated or ignored (Maslin et al 2007: 38).

Fuel Duty Escalator

The Conservative Government introduced this measure in 1993. Its stated aim was to reduce carbon emissions by above annual inflation increases in the price of fuel. Initially set at 3% above inflation, the escalator had risen to 6% by 1997 before Gordon Brown dropped it in Pre-Budget 1999. Its inclusion in the Climate Change Programmes is based on the assumption that demand for fuel in 2010 will be lower than it would otherwise have been without the escalator (Maslin et al 2007: 38). Gordon Brown effectively reintroduced the escalator in Budget 2007.

Renewable Transport Fuel Obligation

The Renewable Transport Fuel Obligation (RTFO) is the DfT's main means of reducing the amount of fossil carbon in transport fuel. The RTFO was the only significant additional carbon reduction measure in CCP 2006. It has been a long time in the making, having been announced in November 2005, but is not due to be implemented until 2008. Currently, Government main support for biofuels takes the form of a 20p per litre duty derogation for biodiesel and bioethanol. Although this differential may have contributed to a recent increase in biofuel production, the introduction of the RTFO was deemed necessary because the UK will fall well short of the indicative target set by the EU Biofuels Directive that 5.75% of fuel by energy is comprised of bio products by 2010. In 2005 just 0.24% of all road fuel came from bio products, a tiny fraction of the amount in France and Germany (EFRAC 2006: para.24)

The RTFO will require transport fuel suppliers to ensure that a set percentage of their sales are from a renewable source: 2.5% volume in 2008-09, rising to 3.5% in 2009-10 and 5% in 2010-11. The Government claims that reaching the 5% level would reduce emissions by 1 MtC per year, the equivalent of taking one million cars off the road (HM Government 2007a: para.7.31).[16] Nevertheless, even if the RTFO 2010 target of 5% by volume is met, it still falls a long way below the 8% by volume level that would meet the target of 5.75% of fuels sold in the EU Biofuels Directive (Ibid: para.66).[17]

The Energy Review 2006 declared the Government's intention to increase the percentage further after 2011-12, thereby providing greater investor confidence in the future of

[16] Maslin et al (2007: 38-9) raise doubts about the Government's predicted savings because they are dependent on a number of generous assumptions about the lifecycle savings of biofuels obtained from wheat.

[17] As biofuels contain less energy by volume than conventional fossil fuels, the UK targets are even further behind EU targets.

biofuels. However, an extension will partly depend on the European Commission relaxing its fuel quality standards, which currently set the maximum proportion of biofuels that can be blended into conventional fossil fuels at 5% by volume.

The RTFO has generally been welcomed as a useful measure (EAC 2006b: para.138; SDC 2006: para.79). There is some concern about certain aspects of the scheme. One Parliamentary Committee fears that the RTFO may 'lock in' first generation biofuels and damage prospects for the commercial development of second generation biofuels, which should be much more carbon efficient than those currently in use (EFRAC 2006: See Box 3.5).

However, as Box 3.5 shows, there are important wider biodiversity and social concerns about an unregulated dash for biofuels. The Government is alert to these issues, and stated in the Energy White Paper that the extension of the RTFO beyond 5% is conditional on being confident *'that the biofuels will be produced in a sustainable way, so that they deliver the maximum practicable carbon savings with the minimum adverse environmental impact'* (HM Government 2007a: para.7.33). Some kind of international certification scheme to ensure that the energy crops have been grown sustainably, safeguarding biodiversity and the wider environment, is essential.

Box 3.5: Biofuels: Good for the Environment?

Biofuels are a low carbon substitute for fossil fuels. They are not carbon neutral because they have a carbon lifecycle that involves emissions arising from changing land-use, production methods (e.g fertiliser use) and transport to the end user (which could be significant if grown in tropical regions).

The current 'first generation' biofuels are extracted primarily from sugar cane, sugar beet, wheat, rape seed and recycled vegetable oil. There are limits to the extent to which they can be blended with existing fossil fuels without necessitating a different fuel distribution structure or new engine requirements.

Second generation biofuels resolve these problems because they are completely compatible with conventional hydrocarbon fuels and can also exploit other sources of biomass such as straw. The carbon savings involved are much higher than with first generation biofuels. However, the commercial development of these fuels is still several years away.

The announcement by President Bush that the USA should reduce petrol usage by 20% within a decade, primarily through the increased use of biofuels, and the EU's decision to set a target of 10% of biofuels from road transport by 2020, will add to the growing demand for them. In the medium term, this demand will have to be met by first generation biofuels.

Yet there are growing environmental and social concerns about a rapid dash for biofuels. Crucially, they take up a lot of land. It is estimated that 13% of available arable land will

be required if the EU is to meet its 5.75% target from within its boundaries. Whilst the UK can probably achieve its 2010 target for bioethanol from exportable wheat, the need to grow oilseed rape for biodiesel would involve a big increase in land use for these crops, possibly resulting in the loss of set aside land if demand was to be met domestically.

To meet an extension of the target to 10% would almost certainly require the import of large amounts of biodiesel, probably derived from palm oil, mainly from Indonesia and Malaysia. Palm oil plantations are already a major factor in the destruction of lowland forest, precious peatland and biodiversity in South-east Asia (FoE 2006; *The Guardian* 4 April 2007). The Sumatran Tiger, Asian Elephant and orang-utans in Borneo will all be endangered (UNEP/UNESCO 2007). In short, if demand for biofuel is met by unsustainable palm oil production, then the overall outcome will be bad for the environment.

Moreover, carbon storage in palm plantations is five times lower than in tropical rain forest, which, combined with the need to transport the oil across the planet, would negate some or all of the carbon savings from substituting it for fossil fuel.

A further social cost of a major shift to biofuel production could see a decline in the amount of land used for food production, creating a potential threat to food security. If the demand for biofuels is high and generous subsidies are in place, more farmers will find it profitable to switch from food to fuel production, resulting in food shortages and higher food prices, which could push the world's most vulnerable populations into poverty.

See DTI (2007) for a detailed economic analysis of biomass energy.

3.7.4. Government Policy on Aviation - Evaluation

Aviation represents a major challenge in the battle to reduce carbon emissions. Although international aviation currently remains outside the Kyoto Protocol, it makes a significant and rapidly increasing contribution to GHG emissions, and therefore should be addressed as part of the Government's attempt to stabilise climate change. Moreover, as is made clear in a recent study of aviation and climate change, if international aviation is included in a post-Kyoto treaty, then the Government's entire Climate Change Programme will be seriously undermined (Cairns and Newson 2006:4):

- Even the most conservative (DfT 2003) forecasts predict that emissions from aviation will reach 17 MtC by 2050 – the higher end is 44 MtC. The current UK target for total emissions in 2050 (based on a 60% cut on base year) is 65 MtC. Consequently, every other sector in the economy would have to make cuts of 71%-87% instead of the currently planned 60%. As the EAC has commented, *'If the Government continues in its policy of allowing just this one industry to grow, it will either cause severe pain to all other sectors or provoke so much opposition as to fatally undermine its 2050 target'* (2006b: para.116). If the Government

decides that scientific evidence requires a higher UK reduction target, then the implications are even more catastrophic.

- The UK generates more flights than any other European country. One fifth of all international air passengers worldwide are flights that arrive at or depart from UK airports. Aviation therefore contributes a proportionately greater contribution to carbon emissions for the UK than elsewhere.

- The potential impact of aviation is even bigger than these forecasts suggest because of the radiative impact of aircraft emissions (from manmade GHGs and aerosols) and contrails may worsen it. At high altitudes it may be several times greater than that of carbon emissions alone – but the science is still uncertain.

- These growth forecasts take account of improvements in traffic management, other operational procedures and technological improvements. If these do not happen, emissions could be higher still.
  (Based on Cairns and Newson 2006: 4)

The inevitable conclusion is that once aviation is included in the GHG inventory post-Kyoto, the UK will miss all its national carbon reduction targets unless the Government takes significant action to reduce the demand for air travel. Yet it is not even an objective of Government policy to reduce the forecast growth in flying (Cairns and Newson 2006: 90-1).

On the contrary, the 2003 Aviation White Paper adopted a traditional 'predict and provide' strategy, which sanctioned an increase in airport capacity that would allow a massive increase in passenger numbers from about 200m/yr in 2003 to around 470/yr by 2030, with CO_2 emissions quadrupling between 1990 and 2050. This strategy was justified on the grounds that it was good for the economy and it reflected people's aspirations.

In no other sector is the need for drastic action so pressing, yet the Government has no credible carbon reduction strategy for aviation.

- CCP 2000 promised no more than that the *'Government would continue to explore options for reducing aviation emissions in the UK'* whilst pressing for action at an international level (DETR 2000a: 101).

- In CCP 2006 the only policy measure identified is to pressure the EU to include aviation in the EU ETS from 2008 or as soon as possible thereafter.

- The Government has addressed the use of other market-based instruments, but the Aviation White Paper rejected the use of both a fuel tax (for legal reasons) and Air Passenger Duty (APD) (because it is a blunt measure) as emission reduction measures. Indeed, the reform of APD in Budget 2000 had resulted in a decline in

overall revenues because it reduced the tax on the popular short-haul budget flights (EAC 2007a: para.63)!

Progress on the inclusion of aviation in the ETS has occurred since the publication of CCP 2006. The Environment Commissioner proposed in December 2006 that aviation should be included in the ETS from 2011 for all flights within the EU, and from 2012 for flights to and from the EU. Airlines will be issued with permits based on their emissions between 2004-06, even though he admitted that emissions had risen by 87% since 1990. Commissioner Dimas suggested this decision could reduce aviation emissions by up to 46%. Yet the predicted increase in the price of tickets will be about £5.40 for domestic flights and £27 for international flights, which seems unlikely to dissuade many people from flying (*The Guardian*, 21 December 2006). If this measure is adopted – it has been accepted by the Council of Ministers but still has to be passed by the European Parliament - and the EU is able to overcome objections from the USA and other non-EU countries, its effectiveness will also depend on the generosity of the allocation of permits and on wider improvements to the operation of the ETS.

With the inclusion of aviation in the EU ETS still at least another three to four years away, and its effectiveness in reducing aviation emissions open to doubt, there remains a very strong case for increasing taxes on flying (Cairns and Newson 2006: 94). Yet the Government refuses to adopt an explicit policy of demand restraint. Whilst David Miliband accepted that the growth of aviation is not good for the environment, Government policy is driven by Tony Blair's (in)famous press briefing that *'I'm not going to be in the position of saying I'm not going to take holidays abroad or use air travel, it's just not practical'*, which led to 'I'm not going to give up my right to fly' headlines (*The Guardian*, 9 January 2007).

Yet there is a compelling and urgent case to reduce demand for flying. The longer the Government delays, the harder it will be to act. The most obvious method in the short to medium term is to use fiscal measures. It is estimated that at least 40% of the recent growth in air travel is a result of fare reductions (Cairns and Newson 2006: 96).

There is some evidence that Government thinking is changing. In his Pre-Budget Report 2006, Gordon Brown announced a significant about turn by doubling all four APD rates. This decision was justified on the grounds that other moves to impose an environmental charge on aviation, such as its inclusion in the EU ETS and international agreement on the taxation of aviation fuel (currently exempted from duty), were taking a long time to come to fruition. The doubling of APD could therefore play a role in *'tackling the climate change impact of aviation'* and deliver carbon savings (on 'business as usual' predicted growth) of around 0.3 MtC a year by 2010-11. In short, this measure represents an implicit acknowledgement by the Government that demand needs to be restrained.

It would seem that in some parts of the Government there is now a recognition that its current approach to aviation is indefensible as part of its wider climate change strategy. Just one year earlier the Financial Secretary had dismissed APD as *'not an environmental tax; it is not related to concern about emissions, it is not related to more efficient aircraft,*

it is not related at all to more efficient use of the aircraft which are flying' (quoted in EAC 2007a: para.65). But if the Government accepts that demand restraint is necessary, APD could then clearly be regarded as an environmental tax – providing that it was set sufficiently high to act as a disincentive to fly. On the 75% of tickets sold each year for short-haul budget flights, the recent doubling of APD does no more than restore the rate previously halved five years ago – still a cut in real terms! If an APD escalator was introduced, which raised rates above inflation each year, then it might bite into the demand for flying. APD could also be reformed to make it 'less blunt': perhaps by levying it according to the emissions of each flight (Cairns and Newson 2006: 95; EAC 2007a: para.69). The Government could also be pressing more effectively for an EU-wide aviation fuel tax and it could impose VAT on domestic flights (like most other EU states).

3.7.5. Summary: Transport Sector

'Transport is both the most technically difficult sector in which to reduce carbon emissions, and also the most politically difficult. Indeed, the latter is the result of the former because neither technological progress nor centralised efficiency improvements by themselves result in the same speed or scale of reductions as in other sectors. Significant cuts in emissions from transport also require widespread behavioural change. Such change challenges one of the very keystones of modern society – the deeply cherished and ever-expanding sense of personal freedom and mobility that has followed the increasing affordability of both driving and flying but which involves profligate consumption of energy' (EAC 2006b: para.151).

This extract from a recent Environmental Audit Committee report summarises the challenges facing any government in trying to reduce carbon emissions in the transport sector. The Labour Government started out with great aspirations for reforming transport policy, but perhaps in no other policy area has its efforts fallen so short.

Its climate change strategy, despite its lack of ambition, will still fail to meet the 2010 targets for the transport sector set in CCP 2000, although it will probably not fall far short of the downwardly revised CCP 2006 targets.

This shortfall is explained by the consistently high level of economic growth since 2000 and the failure of the EU voluntary agreement with car manufacturers to deliver the anticipated emission reductions in new car sales (Maslin et al 2007: 42). Whilst the Government is not responsible for the failings of the voluntary agreement, it should not have placed so much emphasis on this single policy. Whilst company car tax reforms have been a success, the abandonment of the fuel duty escalator (until Budget 2007) and the unwillingness to impose higher VED charges, in the words of the EAC, have contributed to a policy failure that *'betrays a dismal failure of purpose from the Department for Transport'* (EAC 2006b: para.21).

The RTFO, when finally introduced, should reduce emissions as predicted up to around 5%. Beyond that figure, it is essential that the Government has in place strict requirements about the carbon savings and sustainability of biofuel sources.

The Government's 'predict and provide' approach to aviation and the lack of any serious domestic carbon reduction measures – notwithstanding the recent doubling of APD – represents a serious policy failure.

One major obstacle to a more ambitious policy is the Department of Transport itself. The EAC has repeatedly expressed its concern *'over the Department's relative lack of prioritisation and sense of urgency in tackling climate change'* (EAC 2006c: para.4). The EAC has identified in the Department's approach to climate change *'a sense of entitlement owing to transport as a special case'* – that transport should be allowed to increase its emissions whilst all other sectors should cut theirs.

This attitude is encouraged by the Government's reluctance to make concerted efforts to reduce the amount that people drive and fly. In part, this reflects the DfT's *'fatalistic attitude which sees carbon-intensive activities and economic growth as going hand in hand'* (EAC 2006b**:** para.27); in short, that economic and transport growth cannot be decoupled. More importantly, the Government, particularly since the hugely significant fuel protests in 2000, has been terrified of upsetting the motoring lobby and just as nervous about meddling with the budget flight phenomenon.

Thus road transport policy measures – car manufacturer voluntary agreements, VED and the RTFO - have focused on reducing the ***carbon intensity*** of car journeys (the net carbon emitted per unit of fuel consumed or distance travelled). There has been little effort directed towards ***limiting the number and length of vehicle journeys***, which the fuel duty escalator and road pricing could deliver. Despite the success of the London Congestion Charge scheme, the prospect of rolling out a more extensive road-pricing scheme across the country seems to be at least 15 years away. Moreover, apart from some welcome investment in improving train and bus services, far too little has been done to improve public transport to provide a realistic alternative for travellers – by reducing prices, improving the quality and reliability of services and creating a more integrated transport system.

Whilst the doubling of APD represents a small step in the direction of reducing the number of flights people take, some form of APD escalator that delivers significant above inflation increases is the only short term measure that might have an impact on demand, pending international agreement on the taxing of aviation fuel and the modest price increases promised by the inclusion of aviation in the EU ETS in a few years time.

Unfortunately, the Energy White Paper (HM Government 2007a: ch.7) offers no significant new policy measures and repeats the fait accompli approach of previous policy documents that there is little that can be done about transport growth in the short to medium term.

3.8. Summary

The Labour Government has 1997 has taken some action that begins to address climate change, but not nearly enough to address the extent of the problem as indicated by the science. Although Tony Blair played a leading role in advancing the climate change agenda on the international stage, his leadership and dynamism was not matched by a similar ambition at the domestic level. The Government's current target to stabilise greenhouse gas concentrations at 550ppm CO_2 represented the state of scientific knowledge in 2000, but today the science suggests a target of something close to 350ppm CO_2 is necessary to avoid dangerous climate change.

The UK should meet its Kyoto target of reducing greenhouse gas emissions by at least 12.5% below baseline 1990 emissions levels over the period 2008-2012, but it will fail to meet its tougher domestic goal of reducing CO_2 emissions by 20% below base levels by 2010. Indeed, the trend is currently going in the wrong direction: carbon emissions rose in 2006 to reach their highest level since Labour came to power.

The analysis of the four core sectors reveals a set of modest policies that generally represent small steps in the right direction, but everywhere need to be more ambitious and far-reaching (a brief analysis of the role of trade in contributing to climate change is presented in the final section of Chapter 4).

Despite introducing the Renewable Obligation, the Government has failed to do enough to ensure growth in the renewables sector and will miss its target of 10% of electricity to be generated from renewables by 2010. Instead, it looks set to bank on nuclear power to cut the carbon emissions from electricity generation. Yet a successful transition to a low carbon economy will require a more holistic approach to energy policy that considers the institutions and infrastructures that determine the way energy is generated, supplied and used.

In the business sector some progress has been made in reducing emissions via the Climate Change Levy and Climate Change Agreements, but most of the emissions reductions were the result of the initial 'announcement effect'. The EU ETS will have little if any impact on Greenhouse Gas Emissions from the business sector before 2012.

The domestic sector offers opportunities for a range of easily achievable measures to reduce emissions, but the Government has largely failed to take advantage of these opportunities. The Government has repeatedly failed to meet its own targets for reductions in this sector.

In the transport sector, carbon dioxide emissions are rising faster than in any other sector and are likely to become the largest source of UK emissions in the near future. The Government's reluctance to make concerted efforts to reduce the amount that people drive or fly implies little hope for future reductions from this sector. Crucially, the fuel protests in 2000 profoundly shocked the Government, so although the Treasury has introduced some innovative tax measures, it has been extremely nervous about anything that might be construed as increasing the cost of motoring. The Government's 'predict

and provide' approach to aviation and the lack of any substantive carbon reduction measures represents a serious policy failure.

Despite the clear weaknesses in climate change policy, the Government has only recently started to display a greater sense of urgency about the threat from climate change and the failings in UK policy. The last few months have seen a flurry of initiatives that are intended directly or indirectly to strengthen the climate change programme, including the Climate Change Bill, several increases in existing eco-taxes and a range of measures set out in the Energy and Planning White Papers. These initiatives, however, with the possible exception of carbon budgets, do not add up to a fundamental change in policy. Although the science points to the need for a policy revolution, Whitehall still prefers to tinker.

4. Biodiversity Policy Since 1997

Key Chapter Messages

1. The Government has paid less attention to biodiversity than it has to climate change, despite the similarly catastrophic implications of biodiversity loss.
2. Action on biodiversity loss in the UK has been successful at slowing or reversing the decline in some species and habitats but many are either not improving or are still in decline.
3. There is a significant shortfall in funding available for delivering the UK Biodiversity Action Plan.
4. The Government has made positive advances in improving the impact of agriculture on biodiversity, although the funding available to support agri-environmental schemes remains limited.
5. Policy to address biodiversity loss in the marine environment is inadequate; these weaknesses are only partially addressed by the much delayed Marine Bill.
6. The Government's extensive house building plans pose a major threat to biodiversity.
7. If the Government is to achieve its declared aims of halting and reversing biodiversity loss it needs to ensure biodiversity is integrated across the whole spectrum of UK policy.
8. The record of the Government on international biodiversity and trade issues is less impressive than its domestic performance.
9. The Government seems almost indifferent to protecting the rich biodiversity in the UK Overseas Territories.
10. Until recently, DfID has largely ignored biodiversity considerations in its development work, despite the clear links between poverty and environmental degradation.
11. Although it has done some good diplomatic work in the past, the FCO has recently sidelined biodiversity in favour of climate change.
12. The UK Government has pursued a trade liberalisation agenda, particularly in the Doha Round, that has displayed little concern for the biodiversity and climate change implications of free trade.

4.1. Introduction

The Labour Government inherited a UK Biodiversity Strategy from its Conservative predecessor. This UK strategy has developed gradually over the last ten years, but following devolution, the main responsibility for implementing biodiversity policy has been devolved to the four countries of the UK. This chapter starts with an overview of the UK Biodiversity Strategy, and then concentrates on the England Biodiversity Strategy, as the country covering the largest territory and, post-devolution, the only one of the four that is the direct responsibility of the UK Labour Government.

An examination of biodiversity policy simply through nature conservation policy has serious limitations. As the Millennium Ecosystem Assessment makes clear (see Chapter 2) and various Government strategies all acknowledge, it is essential to assess

developments in other policy sectors, notably agriculture, water and housing, to obtain a full picture of biodiversity policy (the impact of climate change will also have major implications for biodiversity). Consequently, the analysis of the England Biodiversity Strategy will focus on the efforts to embed biodiversity considerations across government.

4.2. UK Biodiversity Strategy

4.2.1. Overview

Biodiversity policy in the UK is influenced by a number of external factors, notably membership of the EU, the Convention on Biological Diversity and several other important multilateral environmental agreements such as the RAMSAR Convention which governs wetlands management.

European directives have long shaped domestic policy (see Box 4.1), but as a result of the European Council decision at the Gothenburg Summit in 2001, the UK Government made a commitment to halt biodiversity decline by 2010.

Box 4. 1 EU Biodiversity Policy

The two principal instruments of EU conservation policy are:

1. Wild Birds Directive – requires member states to create Special Protection Areas.
2. Habitats Directive – requiring member states to create Special Areas of Conservation

These two directives underpin the Natura 2000 programme, which aims to develop a comprehensive, linked network of EU habitats.

Although the European Community signed the Convention on Biological Diversity in 1992, it did not develop its own coherent strategy until the publication of the European Community Biodiversity Strategy in 1998. It tries to integrate existing initiatives, both explicitly conservationist legislation such as the Birds and Habitats Directives and other laws that have a direct impact on biodiversity such as the Water Framework Directive and GMO Directives, into a more coherent strategy that builds biodiversity into other policy sectors.

The EU Biodiversity Action Plan 2006-2010 sets out measures to achieve the objective of halting the decline of biodiversity by 2010.

The UK Biodiversity Action Plan (UK BAP) (HM Government 1994a) was the Conservative Government's response to Article 6 of the Convention on Biological Diversity in 1992, which required the UK to develop a national strategy for the conservation of biological diversity and the sustainable use of biological resources. The UK BAP committed the Government to 59 programmes or tasks, primarily focused on the conservation of habitats and species.

Subsequently, a Biodiversity Steering Group was formed to advise the Government on implementation of the UK BAP. It consisted of a wide range of interested parties, including representatives from central and local government, nature conservation agencies and NGOs, industry, academia, farming and land management. The Steering Group developed a range of proposals for monitoring species and producing a set of action plans. A new UK Biodiversity Group (now chaired by DEFRA) was formed in 1996 to steer implementation of the strategy in the four UK countries. By October 1999, a total of 391 Species Action Plans and 45 Habitat Action Plans, each with targeted actions, had been published. In addition, there are currently 162 Local Biodiversity Action Plans.

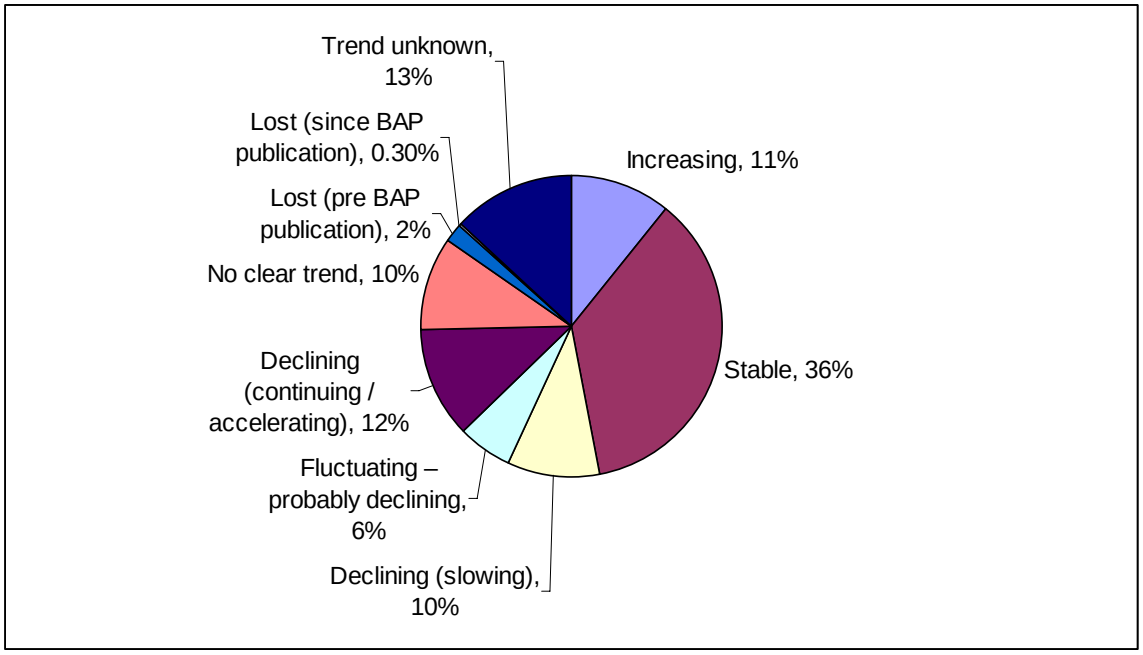
The responsibility for implementation now lies with the UK Biodiversity Partnership, which replaced the UK Biodiversity Group in 2002 following the Government's response to the Millennium Biodiversity Report. The aim was to bring together all the partners involved in or with an interest in the UK BAP, and to coordinate action at the UK level. The Partnership meets annually, but has a Standing Committee to guide and support the Biodiversity Partnership in implementation. The Standing Committee is chaired by the DEFRA Director of Wildlife, Countryside and Flood Management, and consists of the Chairs of the four country Biodiversity Groups (England, Scotland, Wales and N Ireland), and representatives from the four country nature conservation agencies and key NGOs.

Implementation is divided between species and habitat action plans as well as local biodiversity action plans. A number of lead partners co-ordinate work within the plans as well as reporting and monitoring. Statutory Agencies, for example the Forestry Commission, Scottish Natural Heritage and the Environment Agency, have been identified as the Lead Agencies for steering the implementation of the Habitat Action Plans and also act as contact points for Species Action Plans.

4.2.2. Evaluation

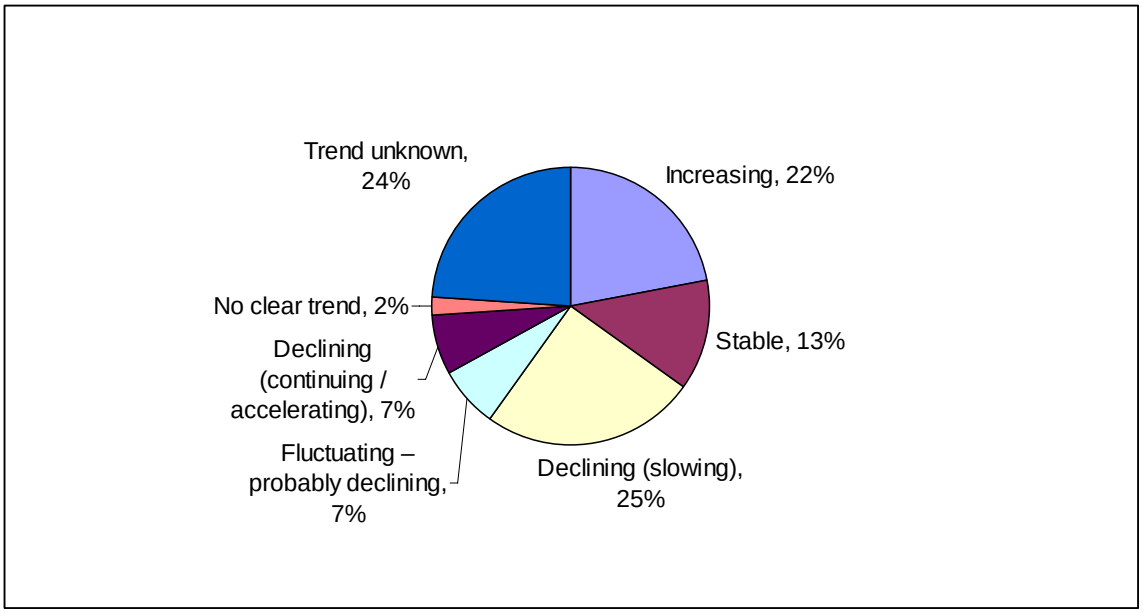
The key test of the progress of the UK BAP, set by the UK Biodiversity Partnership, is whether the status of priority species and habitats is improving. To date, there have been three reporting rounds, in 1999, 2002 and 2005, on the progress of the UK BAP. The status of the species and habitat action plan trends is set out in Figures 4.1 amd 4.3 (DEFRA 2006b).

Figure 4.1 Single Species Action Plan Trends 2005 (N=373)



Source: DEFRA 2006b: 3

Figure 4.2 UK Habitat Trends 2005 (n=45)



Source: DEFRA 2006b: 3

The headline figures highlighted by the report were:

- 10 habitats (22%) and 42 species (11%) are thought to be increasing;
- Although 17 habitats (38%) are thought to be declining, this decline is slowing for 11 (25%) habitats
- 102 species (27%) are thought to be declining, but the decline is slowing for 36 (10%) species

- One species (starry breck lichen) has been lost since BAP publication;
- UK trend was unknown for 11 habitats (24%) and 47 species (13%);

The report presents a decidedly upbeat interpretation of the findings, but closer examination of these figures reveals a more complex picture. Although 42 priority species are increasing, compared to 26 in 2002, there is no reduction in the number reported to be declining. Of 224 species where it is possible to identify a trend between 2002 and 2005, most are unchanged; but for 48 species the trend improved and for 22 it got worse. There is an increasing trend for 10 habitats, compared to 6 in 2002. The decline is slowing for 25% of habitats, but it is continuing or accelerating for 7%. Whilst all of the targets for 51 species and 2 habitats were met, this achievement needs to be set against the fact that the report covers 391 Species Action Plans (covering 475 separate species) and 45 Habitat Action Plans.

Overall, the report observes that there have been more positive signs of progress since the last survey three years earlier, but concedes that much still needs to be done. Not least, over one third of habitats and over one quarter of priority species are still in decline. Moreover, although there was a significant improvement in the level of reporting in 2005, the report found that by 2008 there will still not be adequate data to assess trends for 49% of habitats and 34% of species (DEFRA 2006b: 5). Without such data it will be impossible to provide an accurate assessment of progress towards the 2010 target to halt biodiversity loss.

The survey of Lead Partners in the various BAPs identified three main threats to species and habitats:

- Habitat loss/degradation (particularly due to agriculture or changes in management practice)
- Infrastructure development (mainly housing and coastal development)
- Climate change

We return to these issues below.

However, there is also a fundamental problem with regard to the funding available for the implementation of the UK BAP. DEFRA's own consultants identify a significant gap in the funding, which in late 2006 stood at £339 million per year against estimated costs of £677 million per year. Most of the shortfall - around £311 million - affects the species BAPs. The shortfall affects all four country biodiversity plans. Thus the Government is unlikely to be able to deliver the UK BAP without a significant increase in funding.

4.3. Biodiversity Strategy for England

The Biodiversity Strategy for England, 'Working With the Grain of Nature' (DEFRA 2002a), was prepared by the England Biodiversity Group, which consists of DEFRA, Natural England, the Environment Agency and the main conservation and countryside management NGOs (See Box 4.2).

Box 4.2 Membership of the England Biodiversity Group

- Chairs of England Biodiversity Strategy Implementations Groups
- The National Trust
- Royal Society for the Protection of Birds
- Department for Environment, Food and Rural Affairs
- Natural England
- British Trust for Conservation Volunteers
- Ministry of Defence Estates
- Association of Local Government Ecologists
- National Farmers' Union
- The Wildlife Trusts
- Country Land and Business Association
- Forestry Commission
- Local Government Association
- Environment Agency
- Wildlife and Countryside Link

The Strategy aims to complement action within the Habitat and Species Action Plans under the UK BAP by conserving biodiversity through a combination of:

- Protecting the best wildlife sites
- Promoting the recovery of declining species and birds
- Enthusing people
- Developing the evidence base
- Embedding biodiversity in all sectors of policy and decision-making

The first four elements of this strategy focus directly on 'biodiversity'. The last element represents the fundamentally important recognition that the state of biodiversity is largely shaped by what happens in a range of sectors, and five sectors are identified as of particular importance where it was essential to make biodiversity a fundamental consideration: 1. agriculture; 2. water and wetlands; 3. forestry; 4. marine and coastal; 5. urban and development. A progress sreport on the strategy was published in November 2005 (DEFRA 2006c).

The evaluation of the strategy below concentrates on three of the above categories: protecting the best wildlife sites; promoting the recovery of declining species and birds and, in the next section, embedding biodiversity across all sectors of policy and decision-making. We have already noted the importance of improving the evidence base, and it is of course vitally important to enthuse people, but unfortunately there is little in the way of concrete policy to assess in this area.

Protecting the Best Wildlife Sites

The primary means of achieving this element of the strategy is the Public Service Agreement (PSA) target to:

Care for our natural heritage, make the countryside attractive and enjoyable for all and preserve biological diversity by bringing into favourable condition, by 2010, 95% of all nationally important wildlife sites (SSSIs)

There are over 4000 Sites of Special Scientific Interest (SSSIs) in England covering 7% of the country's land area. The Countryside and Rights of Way Act (CROW) 2000 strengthened the legislative backing for the protection of SSSIs, with the responsibility for implementation now residing with Natural England. Further gaps in the legislation were addressed in the Natural Environment and Rural Communities Act (NERC) 2006.

DEFRA has a trajectory of annual targets aimed at meeting the 2010 target. The March 2006 target of 72% in the required condition (i.e. the area is in a 'favourable' or 'unfavourable but recovering' state) was met, but the March 2007 target of 78% was not met. By May 2007, only 75.43% of SSSIs were in target condition (Natural England 2007a). The remaining quarter of SSSIs is likely to be the most resistant to improvement, especially as 8.57% of SSSI are still described as unfavourable and declining. Although the Natural England Remedies Project has detailed plans for nearly all SSSIs not yet in target condition, meeting the 2010 target is likely to be very challenging for DEFRA.

Two significant obstacles currently impede efforts to meet the 2010 target (DEFRA 2006d: 36-7). First, there has been a much slower than anticipated take up of the Higher Level of Environmental Stewardship scheme by SSSI landowners and managers. This initiative (see Section 4.4.2) should play a key role in reducing overgrazing. Second, the revision of the heather and grass burning regulations and code has been delayed. Natural England believes that making compliance with the Code a condition for burning on SSSIs will play a critical part in bringing the final areas up to target.

It is important to note that the EU plays a major role in the protection of wildlife sites. The EU Natura 2000 programme adopted a list of Sites of Community Importance (SCIs) in 2004. The UK in 2005 became the first member state formally to designate all of its 608 terrestrial sites, submitted under the Habitats Directive, as Special Areas of Conservation.

The Environmental Liability Directive was adopted by the European Commission in 2004 with the aim of preventing and remedying environmental damage to habitats and species protected by the Habitats and Birds Directives, damage to water courses and damage from land contamination that threatens human health. The second stage of consultation to transpose this Directive into UK law is planned for Autumn 2007.

Promoting the Recovery of Declining Species and Birds

The primary means of achieving this element of the strategy is to deliver the UK BAP, namely the priority species, habitat and local action plans, where steady progress has been made.

One key headline indicator of progress towards achieving this strategy is the number of farmland birds, which is regarded as a good surrogate measure of the health of the wider countryside. Consequently, a second biodiversity PSA target is:

Care for our natural heritage, make the countryside attractive and enjoyable for all and preserve biological diversity by reversing the long-term decline in the number of farmland birds by 2020, as measured annually against underlying trends

Populations of farmland birds declined from the mid-1970s through to the mid-1990s, but have been relatively stable since then. The DEFRA plan for reaching the longer-term 2020 target has three stages: to slow the decline between 2004-09; to become stable between 2009-14; to start to increase between 2014-2020. Current indications are that the overall population of farmland birds has stabilised over the last five years. However, this stability hides different trends: some birds, such as the grey partridge, turtle dove and starling continue to decline; others, including the skylark and corn bunting seem to be recovering (DEFRA 2006d: 33). Nevertheless DEFRA is on course to meet the 2020 target.

The two PSA targets on SSSIs and farmland birds have played an important role in delivering the biodiversity strategy. Martin Harper of the RSPB argues that the PSAs have *'driven forward a programme of work that is really impressive'* because they have *'really helped DEFRA to organise itself to focus more on delivery'* (personal interview). Of course, many factors could yet impede progress, and much will depend on developments in the agricultural sector. Of particular importance is the implementation of the 2003 CAP reforms and the Environmental Stewardship scheme (see **2.XX**).

4.4. Embedding Biodiversity in All Sectors of Policy and Decision-making

4.4.1. Agriculture

The agricultural sector must play a particularly important part in the biodiversity strategy partly because such a large proportion of land in England is farmed, but also due to the accumulated impact on biodiversity of half a century of intensive farming. There has been a massive destruction of hedgerows, ancient woodlands, wetlands and lowland heaths, which has harmed many species of mammals, birds, fish and invertebrates. Intensive farming erodes soil quality and consumes vast amounts of water, and run-off from slurry pollutes rivers and underlying water tables.

There have been some important changes to UK agricultural policy under Labour, particularly in the last five years. An important development was the Curry Commission on the Future of Farming and Food, which reported in 2002. The Government's response

in December 2002 was its 'Strategy for Sustainable Farming and Food' (DEFRA 2002b), which included a new emphasis on the protection of natural resources and support for the expansion of agri-environment schemes.

The Common Agricultural Policy (CAP) shapes what happens in UK farming. Labour gradually shifted away from the bipartisan neo-liberal, anti-CAP position of UK Governments – which had made little progress in the EU – to support the use of CAP funds for public goods, such as environmental protection and rural development. The Government lobbied hard for CAP reform and although the reform package agreed in 2003 inevitably did not go as far as it wished, it still represented a fundamental shift in EU agricultural policy. Whereas the CAP previously encouraged the intensification of production, a crucial change is that since January 2005 farming subsidies have been largely decoupled from production so that they are now dependent on meeting a range of good agricultural practices and environmental standards. These new environmental conditions, known as Cross Compliance, include compulsory buffer strips, hedgerow protection and other management conditions that should enhance biodiversity by creating new habitats and linking existing fragmented habitats and isolated species (DEFRA 2006c: 64). The newly formed Agriculture Change and Environment Observatory will monitor how farming practices change in response to CAP reform. In short, CAP is shifting from simply being a subsidy *for* agriculture, to a subsidy that is given to farmers to spend on other public goods.

A key element of the 2003 CAP reforms was the introduction of compulsory modulation, which in EU language is the transfer of money from Pillar 1 to Pillar 2 of the CAP. Pillar 1 involves market support payments, such as intervention buying and export subsidies, and direct payments to farmers under the new Single Payments Scheme. Pillar 2 is designed to support rural development and fund agri-environment schemes. Voluntary modulation was made possible in 2000, but the 2003 reforms required member states to reduce all direct payments by 3% in 2005, 4% in 2006 and 5% annually from 2007, with the money being used to fund Pillar 2 projects providing the funds are matched by the national exchequer.

Subsequently, under pressure from the UK Government, the Council of Ministers agreed that additional voluntary modulation up to 20% that need not be match-funded would be permissible from 2007. The UK needed to do this as its existing budget for rural payments was tiny, so the percentage increases were less significant than elsewhere. Even so, one outcome of the 2005 EU budget deal was that the UK agreed to a budget deal that significantly reduced available funds and *'effectively put a stop on progress in rural development'* (Martin Harper, personal interview).

The area of land under various agri-environmental schemes such as the Countryside Stewardship Scheme and the Environmentally Sensitive Area Scheme has steadily increased since the early 1990s, peaking in 2004, before declining slightly to cover about 12% of agricultural land in England in 2005 (DEFRA 2006c: 55). A major review of the existing agri-environment schemes, informed by the Curry Commission and by the CAP Reforms, resulted in the launch in 2005 of a new Environmental Stewardship Scheme.

The intention is to encourage and support farmers to change their farming methods to protect biodiversity. Environmental Stewardship includes resource protection measures such as the promotion of land management techniques that benefit existing semi-natural habitats, help reverse losses in farmland features of value to wildlife and retain existing semi-natural farmland habitats. Entry Level Environmental Stewardship and Organic Entry Level Environmental Stewardship have the aim of encouraging the majority of farmers in England to participate in some form of agri-environmental scheme with a range simple and effective low-cost land management options. The former addresses problems such as water quality, and the decline of farmland birds, butterflies and bumblebees. The latter seeks to increase the size of the organic farming sector. Higher Level Environmental Stewardship provides additional benefits for a sub-set of farms containing SSSIs and BAP priority habitats and species where management is more costly, complex and intensive, and is targeted to where it can do most good (Ibid: 63).

By early 2007 some 4 million hectares of farmland were covered by the Environmental Stewardship Scheme, which is 40% of all farmland in England. The target of 60% of agricultural land to be managed under the scheme by 2007 remains a tall order, but as DEFRA acknowledges, the predicted wide-scale biodiversity benefits of the Entry Level scheme will only happen if take-up becomes the norm (Ibid: 65). DEFRA and Natural England are currently undertaking a review of the Environmental Stewardship Scheme. An interim evaluation notes the slow uptake of the scheme, particularly at the Higher Level, due to technical difficulties in processing applications – although Natural England announced a streamlining of application procedures in February 2007. On the key issue of environmental impact, it reveals that farmers have so far taken up the easiest options, such as boundary management initiatives. An indication that there is some unease about the environmental impact of the Scheme was the comment by the Chief Executive of Natural England, Helen Phillips, in February 2007, that there was a case for raising the bar at the Entry Level *'to ensure that public money secures real, large-scale environmental gains'* (Natural England 2007b). Agriculture is critical to preventing and rectifying biodiversity loss in England. Much depends on the impact of CAP reform on farming practices. The Environmental Stewardship Scheme can help ensure that these changes are beneficial, but the teething problems facing the scheme need to be resolved quickly.

Two new potential challenges facing the sector will be the impact of wide-scale cropping of biofuels and of GM crops. The potentially devastating effects of a massive increase in biofuel production on biodiversity are discussed in Box 3.5. The relationship between GM crops and biodiversity is much debated. Proponents argue that by using lower levels of pesticide, GM crops benefit biodiversity. Opponents point to the potential damage if cross-pollination results in the spread of pesticide–resistant genes in the wild population, allowing weeds and pests to spread uncontrollably and altering the species composition of wildlife communities with devastating effects on biodiversity. Tony Blair was an enthusiast for GM crops, but the Government reined back its support in response to strong public and NGO pressure in the late 1990s. Despite the inconclusive crop trials and the lifting of the unofficial EU moratorium on the release of GM crops, it remains uncertain if and when commercial GM production in the UK will begin.

Finally, it is worth noting the Government's commitment to further CAP reform, as set out in the 'Vision for the CAP' document, published in December 2005, which calls for the phasing out of Pillar 1 in favour of Pillar 2 payments. This document was poorly received both amongst fellow EU members and within the UK, not least because it was driven primarily by budget-cutting considerations rather than setting out a positive vision for rural policy (EFRAC 2007). In terms of biodiversity, the Vision document has been criticised for failing to set out the details of what the reform might involve. Some Pillar 1 payments do benefit biodiversity, particularly where they ensure that land is still farmed and managed rather than neglected. If the removal of support for farmers resulted in the mass closure of farms, there may be detrimental effects on biodiversity. Pillar 2 activities are costly and if they are to provide any real biodiversity benefits as part of a reform strategy of integrating agricultural and environmental policies, the Government must accept that overall budgets may not fall significantly. The Environment, Food and Rural Affairs committee report on the Vision document argued that the Government needs to publish a revised Vision document that sets out a genuine framework for an EU and UK rural policy (EFRAC 2007).

4.4.2. Water and Wetland Management

The most important factor driving policy on water and wetland management is the EU Water Framework, which applies a catchment-wide approach to land and water management. All countries must agree River Basin Management Plans, including measures for action, by 2009, with the aim of restoring all inland and coastal waters to 'good status' by 2015. Already these river basin plans are generating both water quality objectives and specific targets for designated areas. The development of a River Basin Biodiversity Framework is intended to produce a more integrated approach to the problems of diffuse water pollution, excessive abstraction, water-level management and invasive non-native species.

A longstanding key indicator is the biological quality of rivers, which is critical to the reversal of habitat degradation and restoring wetland ecosystems. River quality improved sharply during the 1990s, but between 2000 and 2004 the river length of good biological quality only increased slightly from 67% to 70% (DEFRA 2006c: 56). The 2003 Water Act strengthened the regulation of water abstraction, whilst the periodic review of water prices is requiring water companies to spend £500 million on improving Natura 2000 sites and SSSI damaged by sewage pollution and over-utilisation of water. However, DEFRA acknowledges that diffuse pollution remains the single biggest challenge to ensuring that water and wetland SSSIs start to recover by 2010. In the longer-term, the success of catchment–sensitive farming depends heavily on adequate funding for land management initiatives to prevent diffuse pollution from agriculture and on the availability of policy mechanisms to intervene where voluntary measures prove inadequate (DEFRA 2006c: 68).

Natural England, the Environment Agency, RSPB and the Wildlife Trusts, supported by representatives from several other conservation NGOs, launched a consultation process in

2006 to produce a joint 'Wetland Vision for England', which will provide a broad view of how wetlands can be restored or re-created for the benefit of people and wildlife.

4.4.3. Woodlands and Forestry

Woodland covers around 1.1 million hectares, or 8.5% of total land area in England. Half of this total is plantation (mostly conifer), and the other half is ancient and native woodland, which is the most biologically rich of terrestrial habitats.

The Government introduced an England Forestry Strategy in 1998. It reflected a broader shift in thinking around the value of woodland and forestry away from wood as a purely economic resource towards a recognition of the much wider range of social, environmental and economic benefits of woodland and forestry. These include health benefits from recreation, educational opportunities, industrial activities such as the processing and manufacturing of local timber products, clean energy options of wood fuel and biomass, and, of course, the important contribution of woodland to biodiversity. One implication is that the management of woodland to optimise wider benefits, by providing income streams to assist in sustainable forest management, can have knock-on benefits for biodiversity. In 2006 the government carried out a consultation that reviewed the 1998 England Forestry Strategy and launched a new strategy in June 2007 (DEFRA 2007d).

The 2007 strategy continues the emphasis on the broader value of woodland and forestry but has a more explicit emphasis on the need to respond to the challenges of climate change. The potential development of the woodfuel industry also receives a lot of emphasis in terms of generating financial returns from woodland management. Since the 1998 strategy, the majority of action to conserve and develop the benefits of woodland continues to be undertaken at the regional, as opposed to the national, level. Each English region has now completed the development of a Regional Forestry Framework. These frameworks are seen as regional expressions of the England Forestry Strategy and set out what action will be taken to enhance the wide range of benefits associated with woodland and forestry, including the maintenance and development of biodiversity. Whilst the Forestry Commission plays an important role in the delivery of these frameworks, other bodies, including Regional Development Associations and various private and not for profit organisations, are equally involved in their delivery. This emphasis on partnership between government and the private and not-for-profit sectors forms the main thrust of the plan for delivery of the new 2007 England Forestry Strategy (DEFRA 2007d).

The completion of a full survey of ancient woodland under Forestry Commission management in 2002 provided the basis for the launch in June 2005 of a new national level policy 'Keepers of Time: A Statement of Policy for England's Ancient and Native Woodland' (DEFRA 2005b), which put native and ancient woodland at the heart of forestry policy. The policy sets out priorities and objectives up to 2020, many of which specifically address woodland biodiversity loss, such as improving the condition of woodland SSSIs. The ODPM introduced in the same year new protection measures for ancient woodland in Planning Policy Guidance 9. Another priority is the restoration of non-woodland, or open, habitats on forest land – 5,000 hectares of heathland had been

restored by 2006. Woodland protection and conservation was included in agri-environmental schemes in 2003, and subsequently into the Environmental Stewardship Scheme. The main priorities up to 2010 will continue to be ancient and native woodland and the restoration of open habitats (DEFRA 2006c: 70).

Improvements to woodland biodiversity face a number of challenges, most of which are those facing water and wetlands management, namely diffuse pollution, development pressures, rising populations of problem species, such as grazing deer and sheep, invasive species and, most important, climate change. The downturn in timber markets has resulted in a decline in woodland management, although it could be reversed if the nascent woodfuel market takes off and better links are made with other strategic policy objectives related to areas such as health, education and recreation. There are also dilemmas regarding best management practices, such as getting the balance between active management and minimum intervention right, or whether the benefits from removing scrub outweigh the loss of young native woodland. A new document setting out best practice for woodland management is to be published in 2010.

4.4.4. Marine and Coastal Management

Healthy ecosystem functioning is vital to ensuring the sustained provision of the goods and services that the marine environment provides. These include direct benefits such as fish and indirect benefits such as the absorption of carbon dioxide, nutrient cycling, processing sewage, climate regulation and the provision of environments for leisure and tourism. Despite these significant benefits that are estimated to contribute to around 5% of the UK's GDP[18], the marine environment has long suffered from a lack of adequate legislative protection. At present only 0.000004% (3km^2 out of a total of 760,000km^2) of Britain's sea area is protected from exploitation from either fishing or oil and gas exploitation. This reflects a broader global trend where only 0.006% of the world's oceans are protected relative to 30% of terrestrial ecosystems (Jha 2007).

The main development in legislation to protect coasts and seas has been the slow progress towards a new marine legislative framework. Most concerned interests have long recognised the need to sort out the confusion surrounding marine legislation so that the marine environment is properly protected and managed, particularly in the face of the twin threats of over-fishing and climate change. The Government also needs to ensure that it delivers the marine elements of the 2010 EU target to halt declining biodiversity and establishing the Natura 2000 network of protected species and habitats.

The WWF launched a campaign for a marine bill in 2000, and other environmental NGOs have provided active support. However, the Government has been very tardy about responding to this pressure. DEFRA included plans for a marine bill in its five year strategy released in 2004, but it took the publication of a draft marine bill by WWF in 2005, strong encouragement from the EAC (2004b: recommendation 17), and persistent lobbying to prompt the Government finally to act by including it in the 2005 Labour manifesto. After further delays a consultation paper was published in March 2006 followed eventually by a Marine Bill White Paper in March 2007.

[18] Based on figures published by WWF UK. See http://www.wwf.org.uk/marineact/key.asp

The broad aim of the Marine Bill is to provide a new framework for the management of our coasts and seas, based upon marine spatial planning. It includes a more efficient and transparent system for licensing marine activities, the establishment of a Marine Management Organisation to contribute to sustainable development in the marine environment and plans to modernise marine fisheries management.

Significantly, the White Paper outlines new mechanisms for conserving marine wildlife that aims to halt *'the deterioration in the UK's marine biodiversity and promote recovery where practicable, support healthy functioning and resilient marine ecosystems'*. By 2012, the intention is to have established about 30 full marine sites under Natura 2000, including the Dogger Bank in the North Sea, which is an important spawning ground for fish and dolphins, and the Darwin Mounds, a cold coral reef NW of Scotland. An important new measure will be the creation of managed Marine Conservation Zones (MCZs), including highly protected sites, to protect species and habitats not currently covered by EU legislation. Highly protected sites in particular will provide a breathing space to allow species and habitats to recover to a more sustainable state.

The Marine Bill White Paper received a generally warm welcome from the Green Lobby, which is focused now on ensuring that the Bill (for which consultation finished in June 2007) gets space in the Parliamentary calendar in 2007-08. There are some reservations about the unambitious language used in the White Paper. For example, the Wildlife Trusts bemoan the emphasis on balancing environmental, economic and social interests, rather than on giving priority to scientific ecological considerations. Indeed, they believe that industrial stakeholders, notably the fishing, oil and gas industries, have been allowed too much influence. For example, the White Paper states that MCZs should cover *'as small an area as possible'* and minimise the number of sites in areas where there is the potential for industrial activity (Wildlife Trusts 2007: paras.15-21). However, although long in gestation and less ambitious than some environmental NGOs would like, the Marine Bill represents an important advance.

Competence in the management of fisheries has been largely transferred to EU level, where it is implemented through the Common Fisheries Policy (CFP). Unfortunately, the CFP has failed to manage fish stocks in a sustainable way. There is a strong scientific consensus on the precarious nature of global and European fisheries. For example, an RCEP (2004) report called for a large-scale network of marine protected areas, with 30% of the UK's exclusive economic zone closed to commercial fishing, the decommissioning of UK fishing fleet to reduce it to an environmentally sustainable level, tight control over fishing effort (or activity) and an end to deep sea trawling. Yet neither a 2005 report from the Prime Minister's Strategy Unit nor the Marine Bill make many positive moves in this direction. At EU level, fisheries ministers, lobbied hard by domestic fishing industries, have repeatedly failed to impose the kind of stringent CFP limits that scientists demand.

4.4.5. Towns, Cities and Development

The continued expansion of urban development has a huge potential impact on biodiversity. A major driver behind future expansion is the Government's plans for new

houses and the associated infrastructure. The Barker Review of housing supply identified a major shortage of housing stock (Barker 2004), and the Government responded by planning for 200,000 new homes to be built annually by 2016. Gordon Brown increased this figure to 240,000 in his July 2007 statement on the Government's legislative programme. This rate of growth will have a range of effects on biodiversity, including the development of greenfield sites, additional pressure on already stretched water supplies in South-East England, and development of vulnerable floodplains.

The pressure on biodiversity is likely to be exacerbated if the proposals laid out in the Planning White Paper (HM Government 2007b) and planning reform bill are introduced. The measures to speed up the planning process for major infrastructure projects, such as airports, motorways, reservoirs and power stations could mean that objections based on biodiversity considerations are overridden too easily, particularly if the new Independent Planning Commission is dominated by people with an economics background. However, the White Paper does reiterate the Government's support for Green Belts.

The Government is aware of these issues. It aims to build 60% of new housing on brownfield sites and Gordon Brown has announced plans for the construction of five new eco-towns with a much lower impact on the environment. Various planning policy statements, circulars and good practice guidance notes have been published in the last five years that emphasise the need for the planning system to address biodiversity loss, advise local authorities on how to protect and enhance the natural environment, and encourage the provision and protection of open space. In particular, 'Planning Policy Statement 9(PPS): Biodiversity and Geological Conservation' issued in 2005 makes clear that planning policies should aim to maintain and enhance, restore or add to biodiversity.

Despite these progressive measures, there is still scope to improve existing policies and guidance. The recent RCEP (2007b) report on the 'The Urban Environment' calls for a more strategic approach aimed at increasing the amount of green infrastructure in towns and cities by, for example, encouraging river restoration, sustainable drainage systems, green roofs and tree planting. The report recommends that the DCLG and its devolved equivalents amend its planning advice and guidance *'to reflect a broader definition of the natural environment in urban areas and to recognise and protect the role that urban ecosystems can play in improving towns and cities'* (RCEP 2007b: 10). Given the potential impact on the environmental infrastructure of these house building plans, it is vital that DEFRA works closely with DCLG and local authorities to ensure that biodiversity considerations are central in every planning decision.

More fundamentally, whilst such improvements could make significant improvements to biodiversity in existing towns and cities, they can only ameliorate the irreversible impact on biodiversity of new housing construction on greenfield sites. The Government's house-building plans have accepted the 'predict and provide' philosophy underpinning the Barker Review of Land Use Planning (HM Treasury 2006b). For example, 72% of projected growth in households to 2026 will be single occupancy households. Yet the review failed to consider how higher occupancy households might be encouraged or how the impact of single occupancy might be lowered (EAC 2006d: para.117).

4.4.6. Biodiversity and Climate Change

In addition to the aim of embedding biodiversity into other key policy sectors, DEFRA has also recognised the importance of addressing the impact of climate change on biodiversity. It has established a Climate Change Adaptation workstream to provide better guidance on the impact of climate change, identify research needs and promote the adaptation of policies and programmes within the strategy. This initiative has generated two reports, both published in May 2007.

The first report 'England Biodiversity Strategy – Towards Adaptation to Climate Change' (DEFRA 2007e), reviews the scientific evidence to predict changes to biodiversity across the five core sectors of the England Biodiversity Strategy. It identifies 7 out of 32 priority habitats as being at high risk, and 14 at medium risk, from the direct impact of climate change. There are also a range of indirect effects, depending on how different sectors respond to climate change. For example, in water and wetlands, the pressures for greater abstraction and fragmentation by artificial impoundments such as flood control and hydro-electric power, may threaten biodiversity. But the creation of wetlands for flood control or water storage, and the introduction of integrated river management may offer opportunities. The report focuses on the challenges of adapting to climate change, and identifies six adaptation measures: ranging from existing measures such as protected sites, to encouraging the dispersal of species from existing habitats to new habitats via 'corridors' or 'stepping stones'. There is also recognition that climate change may force a 'paradigm shift' in attitudes to nature conservation, with the implication that some habitats or species may become impossible to defend.

The second report, 'Conserving Biodiversity in a Changing Climate: Guidance on Building Capacity to Adapt' (DEFRA 2007f) sets out new practical guidance to help those involved in biodiversity management adapt to climate change based on the implementation measures identified in the first report.

These initiatives represent an important step forward – the challenge will be to implement the new guidance.

4.4.7. Natural England

The Natural Environment and Rural Communities (2006) Act established Natural England to absorb the work of three agencies: it replaced English Nature, the Countryside Commission (landscape, access and recreation functions) and the Rural Development Service (environmental land management functions). It was justified as an attempt to improve the integration of a range of environmental responsibilities and services.

Natural England is still bedding in, trying to bring the staff, work cultures and functions of three separate agencies into one organisation. It is far too early to make any judgement about its impact. However, there are concerns about the loss of English Nature, which was seen in environmental circles as a champion for the environment. Such concerns were compounded when, even before it had started, Natural England's budget was cut, partly as a result of the Single Farm Payments fiasco that forced DEFRA to make cuts across most of its work. Yet those cuts seem to bite far more heavily into the biodiversity

aspects of its work, rather than the climate change elements, indicating the political priority currently enjoyed by the latter.

4.5. Protecting International Biodiversity

The UK can play a role in protecting global biodiversity in a number of ways, notably:

- By helping to implement multilateral environmental agreements (MEAs)
- By building environmental considerations into the development work led by DfID
- By ensuring that international trade is based on principles of sustainable development

4.5.1. International Organisations and MEAs

The UK is a signatory to numerous MEAs that are intended to protect the environment, including:

- UN Convention on Biological Diversity
- UN Convention to Combat Desertification
- Convention on International Trade in Endangered Species (CITES)
- Convention on Pollution from Ships (MARPOL)
- Convention on Wetlands of International Importance (RAMSAR)
- Convention for the Protection of the Marine Environment of the North-east Atlantic (OSPAR)

The UK is also a strong supporter of and significant donor to several key international organisations, including the UN Environment Programme (UNEP) and the Global Environmental Facility, which funds projects in developing countries that enhance the environment or promote sustainable livelihoods. It also set up the Global Opportunities Fund in 2003 under the auspices of the FCO which provides funding for projects considered to be of strategic importance to the UK. This includes several biodiversity related projects (e.g. sustainable forestry) under its sustainable development theme. GOF funding for 2006-7 was around £70m.

All of these MEAs and organisations, apart from the Global Opportunities Fund, pre-dated the Labour Government, which in broad terms has maintained the policy approach of the previous Government. Indeed, at the level of international environmental diplomacy the UK has often played a leading role (EAC 2007c: para.55). Thus, for example, continued involvement in the Agenda 21 process led to new commitments arising out of the World Summit on Sustainable Development in 2002, on biodiversity, oceans, fisheries and agriculture. The UK contribution of £140 million in 2006 made it the fourth largest donor to the Global Environmental Facility. The Government has been able to defend the moratorium on whaling against strong attempts to end it by Japan. The UK was also a major financial contributor to the Millennium Ecosystem Assessment.

However, a number of developments and challenges can be identified.

A Coordinated Approach

The Government has acknowledged in the sustainable development strategy document, 'Securing the Future', that it still needs *'to develop a clear vision and coherent approach for the UK to the protection and enhancement of natural resources'* (DEFRA 2005a: 98), and DEFRA has identified the existing framework for protecting the natural environment as too *'complex and fragmented'* (EAC 2007c: para: 53). These problems are particularly acute with regard to international biodiversity. One problem is to ensure a coordinated approach when several different departments have responsibilities for different aspects of policy. Thus the lead role in the international environmental organisations and treaties is generally taken by DEFRA or the FCO, but DfID plays the lead on the UN Desertification treaty.

Public Sector Agreements

The PSA target-setting strategy represents one attempt to integrate biodiversity considerations across Departments. Both DEFRA and the FCO have PSA targets that directly address biodiversity issues:

- DEFRA's target to promote sustainable development includes an international element to deliver commitments made at the 2002 World Summit on Sustainable Development (WSSD) on, amongst others, biodiversity, oceans, fisheries and agriculture.

- The FCO has one PSA target to enhance sustainable development, which is made up of seven indicators including three with particular direct relevance to biodiversity: 'improved natural resource management', 'greater international commitment to tacking illegal logging' and 'increased implementation of environmental charters in the Overseas territories'.

In addition, DfID has a broad aim of achieving the eight Millenium Development Goals, one of which is 'ensuring environmental sustainability', although this does not form a direct element of any of its PSA targets.

The Foreign and Commonwealth Office (FCO)

However, a recent EAC report found that the FCO has increasingly focused on climate change and governance, rather than on biodiversity. Internal restructuring of the FCO to realign itself with the priorities set out in its 2006 White Paper 'Active Diplomacy for a Changing World' has resulted in less attention and fewer resources allocated to environmental issues other than climate change and energy. The former head of sustainable development in the FCO, Nick Mabey, observed that *'the focus on other environmental issues has been severely damaged by the restructuring'* (EAC 2007c: para.44). The restructuring has also led to a reduction in expertise on environmental issues, which is acknowledged by the FCO. The EAC also found a 'disconnect' between the FCO and DEFRA on key biodiversity issues, such as whaling (Ibid: para.57).

UK Overseas Territories

The UK is directly responsible for 14 Overseas Territories (UKOTs), including Bermuda and the Falkland Islands, which are globally significant in terms of their rich, but increasingly threatened, biodiversity. Indeed, such are the threats that they could prevent the UK from delivering its World Summit on Sustainable Development (WSSD) commitment to significantly reduce biodiversity loss within its territory. The EAC has identified the lack of funding for conservation as a major problem, because their small populations generate limited public funds, and they are not eligible for most UK funding or international grants. It has argued that *'Government must act decisively to prevent further loss of biodiversity in the UKOTs'*, which should involve a significant increase in funding for conservation and ecosystem management (EAC 2006d: paras 133 & 140). As a result of some small increases in funding the 'Overseas Territories Environment Programme' will receive just under £1 million in 2007-08. Yet the RSPB suggests that to meet identified needs the annual budget should be around £16 million per annum for the next four years. Although these figures are only indicative estimates, they demonstrate clearly that current funding is grossly inadequate to meet 'biodiversity conservation priorities' (Ibid: paras.74-5).

Department for International Development (DfID)

The most direct way in which the UK can influence policy in other countries is through the development work of DfID across a range of countries in Africa and Asia. However, despite the strong links between environmental degradation loss and poverty and even though 'environmental sustainability' is a Millennium Development goal, DfID has been strongly and repeatedly castigated by the EAC (2006e) for giving insufficient attention to the environment. The litany of criticisms includes:

- Bizarrely, in the Development Act 2002 DfID defines sustainable development as development that is *'prudent having regard to the likelihood of its generating lasting benefits for the population of the country'*. There is no definition of 'lasting benefits', and no direct mention of the environment, let alone any recognition of the need to balance social and economic needs with the environment.

- There is a lack of urgency within DfID about integrating the environment into direct budget support for governments.

- A policy document, 'DfID's Approach to the Environment' (February 2006) states that DfID's main focus is on how the environment can contribute to poverty reduction. This very narrow approach fails to acknowledge that environmental protection might prevent poverty occurring in the first place. A more strategic approach to the environment is required.

- DfID has no direct PSA target that reflects the need to prioritise climate change and biodiversity loss.

- DfID displays little recognition of any sense of environmental limits. It does not seem to have absorbed the Millennium Assessment conclusion that a majority of ecosystem services are continuing decline.

- There is no mention of sustainable water management in DfID's Water Action Plan, and just one vague commitment in its Agricultural Policy statement. The documents recognise various environmental issues raised by DfID's actions, but fail to identify remedial measures. Yet as the Millennium Assessment makes clear, both sectors have a huge impact on biodiversity loss.

- DfID lacks the necessary environmental capacity, although recent reviews of organisational structure and advisory skills may help address this weakness.

- Several evaluations of DfID country programmes 'could not be more damning' in demonstrating DfID's failure to adopt a coherent approach to the environment on the ground.

More specifically, preventing biodiversity loss has historically been a very low DfID priority. Several people interviewed for this report agreed with Martin Harper of RSPB's observation that whilst Clare Short was Secretary of State, *'biodiversity was a word that simply could not be mentioned'*. Under Hilary Benn, and with the appointment of Professor Gordon Conway as Chief Scientific Advisor, DfID has become much more open to environmental concerns generally and biodiversity protection in particular. For example, the EAC found that DFID officials *'seem to realise increasingly the importance of the environment in reaching poverty reduction goals'* (EAC 2006d: para.106). This has, however, been accompanied by concerns that the natural science backgrounds of those charged with embedding environmental concerns within DFID might result in a failure to build on some of the better examples of DFID's inter-disciplinary environmental work, as well as pushing technical solutions at the expense of more complex socio-economic considerations (see Lovett et al 2006). Yet the extent and speed of change should not be exaggerated. The same EAC report observed that *'DFID White Papers have failed adequately to account for the role of the environment in development. This failure indicates to us that knowledge of the importance of the environment to development objectives has not permeated all levels of DFID'* (EAC 2006d: para.106).

Millennium Ecosystem Assessment

The UK Government was a major donor to the Millennium Ecosystem Assessment. There is some evidence that, at least in parts of DEFRA, DfID and the Treasury, the findings are slowly permeating the corridors of power (EAC 2006d). For example, DEFRA is funding research to quantify the economic benefits of sustainable ecosystem service management. In DfID, although officials seem to recognise the importance of the environment in achieving poverty reduction goals, DfID White Papers have attributed little attention to the environment (Ibid: para.106). The EAC also stressed the importance of the Treasury ensuring that the Millennium Ecosystem Assessment has influenced the Comprehensive Spending Review process, notably by identifying the true value of various eco-system services, in order to prevent unsustainable practices being 'locked in'

for the duration of the next set of PSA targets. In short, if the biodiversity message has got through, then the CSR should be expected to provide increased budgets for effective ecosystem management.

4.6. Trade, Biodiversity and Climate Change

The Labour Government, both individually and within the EU, has been a strong advocate of the trade liberalisation. There are fierce debates about the relationship between free trade and the environment, which are briefly summarised in Box 4.3. Without taking sides in this debate, it is clear that even if free trade does result in net environmental benefits, there will still be specific costs to the environment. It is therefore crucial that the UK Government identifies these costs and works to reduce the environmental consequences of liberalisation. Yet Government policy currently attributes little importance to the compatibility of its trade and environmental policies, with sustainability issues of marginal importance, particularly for the DTI **(**EAC 2006f: para.29). There are several areas where Government policy is open to criticism.

Box 4.3 Is Free Trade Good For The Environment?

Free trade is good for the environment

Free trade contributes to economic growth, which generates the wealth necessary to fund environmental improvements such as greener technologies

Free trade allocates resources more efficiently than any other system, resulting in lower usage and therefore fewer wasted resources because a) countries will specialise in those products that they are relatively better at producing, which is more efficient than pursuing national self-sufficiency in a wide range of goods; b) protectionist trade restrictions are removed, such as tariffs, quotas and export subsidies, which reduce the incentive to develop greener technologies and encourage over-consumption by under-pricing goods on the domestic market.

The ‘race to the top’, or ‘trading up’, means that countries will adopt the higher environmental standards of richer countries (e.g. California and the EU) to enable their businesses to compete in those lucrative markets.

Free trade is bad for the environment

Any benefits from more efficient resource use will rapidly be overshadowed by the overall growth in the economic activity encouraged by free trade. Efficiency gains that result in lower prices will increase demand for those goods; for example, the benefits of improved aircraft fuel efficiency have been outstripped by the rapid growth in air passenger traffic.

More trade means more greenhouse gas emissions and pollution simply from transporting more finished and partially completed goods around the planet.

Free trade and open markets more generally fail to include the external environmental costs of economic activity such as the use of unpriced natural resources (e.g.timber or

water), or the impact of pollution from by-products of production or transportation. These costs are often higher in developing countries where property rights are not properly allocated or enforced so natural resources can be freely depleted. This means that the consumer does not pay the full price of traded goods, and increased trade leads to more environmental destruction.

Free trade may also exacerbate economic inequities and environmental damage because one feature of globalisation is that capital is highly mobile, and labour is also much more mobile, so the specialisation of production is likely to concentrate pollution in particular locations, typically in developing countries and regions, whilst the richer countries enjoy the benefits of the goods without suffering negative environmental impacts in the short term (although in the long term biodiversity loss and carbon emissions will have global impacts). In the developing world, production for export is often heavily dependent on the unsustainable use of natural resources (such as forestry, fishing, coffee and palm oil plantations).

Rather than encourage a 'race to the top', free trade will provoke a 'race to the bottom' to 'lowest-common-denominator' environmental standards.

Reform of WTO/Doha Round

Even proponents of free trade recognise that the international trade system is out of balance, because those institutions responsible for governing trade, notably the WTO, are much more powerful than those protecting the environment, so the interests of big corporations receive higher priority than environmental protection or the concerns of local communities (Brack 2005:3). The challenge, therefore, is about how best to 'manage' trade to ensure it minimises environmental damage.

Obviously, the UK alone can exercise only limited influence over the WTO, although the EU is a major player in international trade diplomacy. The Doha Development Round, which is currently stalled over the issue of agricultural subsidies, could result in decisions that have enormous significance for the environment, yet the UK Government has not given sufficient attention to environmental considerations. Two issues in particular stand out:

First, DfID is focused on agricultural reform as a means of alleviating poverty as one of its Millenium Development goals. The assumption is that the removal of subsidies and tariffs will help agricultural development, which helps the poorest farmers and stimulates economic activity. Yet agriculture has a huge impact on both biodiversity and climate change from, for example, deforestation, the impact of irrigation on water supply, pollution of water and land from agri-chemicals and increased greenhouse gas emissions from transporting produce, particularly by air freight.

A second important issue is whether key multilateral environmental agreements contravene WTO rules by imposing restrictions on trade (e.g. the ozone treaty bans trade in ozone-depleting substances), particularly where different restrictions are applied to parties and to non-parties to the agreement. Although no cases have yet arisen the awareness of a possible WTO challenge to an MEA has resulted in a conservative

implementation of existing MEA trade restrictions and it is having a 'chilling' effect on ongoing multilateral negotiations (Eckersley 2004). Even though all sides acknowledge this MEA/WTO tension needs to be resolved, it has low priority on the Doha agenda. Whilst major imbalances in trade remain, especially in agriculture, and national interests dominate, there is little political will on any side to address environment issues. Moreover, there is still deep suspicion amongst less developed countries that the environmental agenda is an excuse for protectionism by the developed countries – and they can point to EU agricultural policy to support this view. It is incumbent on the UK Government and the EU to 'demonstrate clear leadership' on this issue, even when it not in the short-term interests of the UK to do so (EAC 2006f: para.96). Yet the attitude of ministers seems to be that a trade deal must be agreed first, and then the environmental aspects can be bolted on later.

Public Procurement

With around £150 billion spent annually by the public sector, the potential impact of procurement policies on the alleviation of poverty and sustainable use of natural resources are considerable. The 2005 Sustainable Development Strategy committed the UK to becoming a leader in the EU by 2009, with the aim of stimulating the market for more sustainable goods. After criticisms from the EAC and NAO, the Government eventually published a National Action Plan in 2006 (DEFRA 2006e). Although it may be too early to judge the impact of this strategy, very little seems to have happened since its publication. Indeed, in a recent speech Jonathan Porrit observed that 'There has been a lack of sustainable procurement leadership. There is just not enough affirmation of people saying they want this delivered'. He noted that the Sustainable Development Commission would be appraising permanent secretaries and department chief executives on their sustainable procurement performance and commented that. 'There is a lot of nervousness about this - and so there bloody well should be' (Supply Management 2007).

However, one issue of vital importance for biodiversity and climate change where progress has been made is sustainable timber procurement. As around 20% of UK timber is purchased by Central Government, rising to around 40% if local authorities and agencies are included, it is possible for the Government to make a real difference. Indeed, the UK Government has become something of an international leader on this issue (EAC 2006g: para.95). In 2000 it imposed a binding requirement on Departments to try to purchase timber from legal and sustainable sources, and in 2003 set up a Central Point of Expertise on Timber to facilitate the implementation of this policy, including setting up certification schemes. The Government has pushed hard for more Voluntary Partnership Agreements between individual countries and the EU, which certifies the timber exported to the EU from that state. There is still plenty of scope for improvement, notably in the quality of data available to evaluate whether the policy is being delivered and in the process of certification (Ibid: para.63 & 84). Nevertheless, this is an issue on which the Government has made good progress.

4.7. Conclusion

Biodiversity has always been lower on the Blair Government's agenda than climate change. Despite this low visibility, there have been some important developments in domestic biodiversity policy, encouraged by the well-established conservationist lobby and by individual ministers (notably Michael Meacher and Elliot Morley) who displayed considerable zeal for reform. However, progress on international biodiversity issues is far less impressive.

The Labour Government has considerably developed the UK biodiversity strategy it inherited from the Tories, although post-devolution its implementation is now primarily the responsibility of each country. There is a reasonably sound and comprehensive biodiversity strategy in England, although still heavily dependent on the remarkable voluntary work of many conservation NGOs. There have been important pieces of legislation, notably the Countryside and Rights of Way and Natural Environment and Rural Communities Acts, which have strengthened the biodiversity framework. The inclusion of two PSA biodiversity targets for SSSIs and farmland birds has also helped DEFRA to press for action across other policy sectors.

The UKBAP has delivered reasonably well against the habitats and species targets, although a considerable number of species are still in decline. But the UK BAP has probably achieved the easiest targets to date – the tougher challenges remain, and the England Strategy has fallen behind schedule for SSSI targets. There is clear evidence of a significant shortfall in the funding required to deliver the key UK BAP targets.

The England Strategy recognises the need to embed biodiversity across government. Sensible plans have been developed (or are under development) for the forestry, water and wetland sectors. The much delayed Marine Bill includes some progressive measures, but there is some scepticism in environmental circles as to how much it has been diluted due to the powerful political influence of the fishing, oil and gas industries.

The most significant advances have been in the agriculture sector, where CAP reform has enabled a shift of resources to support agri-environmental schemes, although the Environmental Stewardship scheme has encountered some implementation problems. There is a danger that the Government may be over-dependent on agriculture to deliver biodiversity improvements. The Planning White Paper and current house-building plans represent a real threat to biodiversity and other key sectors such as transport, energy and industry give biodiversity loss little attention.

It is important to note that large parts of domestic biodiversity policy follow an approach that reflects the key policy messages of the Millennium Ecosystem Assessment, as set out at the end of Chapter 2. Many of the principles of the ecosystem approach – protected areas, species protection, ecosystem restoration, direct payments for biodiversity protection, amongst others - are enshrined in the BAPs and in recent sector strategies. The immediate problem is acute under-funding of the UK BAP. The wider – and bigger – challenge is to embed these principles across policy sectors.

The record of the Government on international biodiversity and trade issues is less impressive. Although the Government continues to play its part in implementing international environmental agreements, in areas where it can influence a direct impact overseas, it has been found wanting. The Government seems almost indifferent to protecting the rich biodiversity in the UK Overseas Territories. Until recently, DfID has largely ignored biodiversity considerations in its efforts to promote development. Although it has done some good diplomatic work in the past, the FCO has recently sidelined biodiversity in favour of climate change. By contrast with domestic biodiversity policy, there is very little evidence as yet of the Millennium Ecosystem Assessment principles shaping UK international biodiversity policy, with the exception of sustainable timber.

Finally, the UK Government has pursued a trade liberalisation agenda, particularly in the Doha Round, that has displayed little concern for the biodiversity or climate change implications of free trade.

5. Environmental Policy: Challenges and Obstacles

Key Chapter Messages

1. The Labour Government has never denied the science of climate change. The Prime Minister and key environment ministers have certainly grasped the urgency of the situation, but this urgency is not shared across the Government in key economic Departments.
2. The Government understands the basic need to conserve biodiversity by protecting precious habitats and species, but the fundamental messages of the Millennium Ecosystem Assessment about the fragility and importance of ecosystems are only slowly trickling down into DEFRA, DfID and the Treasury.

Party Politics

3. Until the last year, the environment has remained a low profile issue in party politics. The Labour and the Conservative parties have paid minimal attention to the environment in their party manifestos, whereas the Liberal Democrats have consistently made it a central campaigning issue.
4. Political parties tend to pay more attention to the environment in the mid-term of a parliament, but shy away from it around general elections.
5. Blair's interest in climate change did not progress to engagement with broader environmental issues.
6. There has been a clear 'Cameron effect' on environmental politics. The attention given to the issue by David Cameron has helped move the environment up the political agenda and encouraged policy responses by Government.

The Labour Party and Environmentalism

7. Action on the environment can conflict with traditional Labour emphases on economic growth and job creation. It also implies lifestyle compromises that are perceived as unattractive to target 'middle England' Labour voters. .
8. Progressive environmental policies often involve regulation or taxation, which challenge 'New Labour's' efforts to be more business friendly.
9. There has been little pressure on the Government from the wider Labour Party – 'New' or 'Old', in Parliament or beyond - to take a tougher stance on the environment.

The Environment as 'Bad Politics'

10. The environment is viewed to be 'bad politics'. It often involves unpopular measures now, the benefits of which will only be felt by future generations. This has been reflected in Labour's reluctance to adopt tougher policies to protect the environment, particularly in the transport and energy sectors.

The Green Lobby

11. Most of the 'green lobby' welcomed the election of the Labour Government and was initially a little uncritical of its efforts, but that benevolent attitude soon dissipated.

12. The Government has often privately expressed its frustration with the more oppositional elements of the green lobby for failing to support publicly some of its braver actions on environmental issues, such as the introduction of the Climate Change Levy.
13. Although the green lobby has exercised some modest influence over environmental legislation, it has failed (despite clear encouragement from the Government) to mobilise the kind of mass support for environmental issues that would put irresistible pressure on the Government to introduce more stringent environmental measures.

Business Interests

14. Business interests have succeeded in preventing or delaying Government action on numerous environmental problems and have managed to dilute many proposals that it is claimed would have imposed significant costs on business interests.
15. The CBI has exercised an important, mostly negative, influence over Labour environmental policy.
16. However, not all business interests adopt anti-environmental positions and there has been something of a sea-change at the very centre of the mainstream corporate world as epitomised by the Corporate Leaders on Climate Change.
17. With the environmental leaders in each sector already coming onside, there is currently an unprecedented 'window of opportunity' to win the support of mainstream businesses for more progressive environmental measures.

Policy Integration

18. The Government has failed to integrate properly action on the environment across different policy areas - individual ministries still typically engage in a blinkered pursuit of narrow sectoral objectives with little consideration for their environmental impact.
19. The creation of the Department of Environment, Transport and the Regions (DETR) was a bold move that encountered some teething problems. The subsequent dismantling of the DETR has separated the environment from both planning, which makes little sense, and transport, which effectively sidelines environmental considerations from this key sector.
20. Although the sustainable development strategy has introduced what on paper looks an impressive set of administrative structures and mechanisms aimed at enhancing environmental policy integration, in practice its impact has been limited.
21. Policy integration has been further impeded by Tony Blair's style of government, with its focus on bilateral discussions with chief ministers and a downgrading of Cabinet discussion. This approach limited the degree of inter-departmental discussion so that individual Departments often lack the information – let alone the inclination – to consider the environmental impact of their policies in other policy sectors.

Political Leadership

22. The design and delivery of effective policies to address cross-cutting problems such as climate change and biodiversity loss requires visible, committed and sustained political leadership to drive these strategies across government. The Labour Government has not provided that leadership for domestic environmental issues. One consequence is that individual departments such as transport still marginalise environmental concerns. Another is that potentially unpopular policies such as fuel duty increases, road pricing and aviation taxes have been avoided.
23. Two people in Government could have provided the necessary domestic strategic leadership: Tony Blair or Gordon Brown, yet it was not forthcoming. To drive any policy through the political process and the governmental bureaucracy requires considerable political capital, but Blair and Brown both gave priority to other issues or had more urgent demands on this precious commodity.
24. It took the appointment of David Miliband as Secretary of State for the Environment to provide some real domestic leadership on the issue. His arrival coincided with a general rise in the profile of climate change and the impact of the 'Cameron effect' on domestic environmental politics. Miliband exercised some influence across Government, securing legislative time for the Climate Change Bill and support for several other initiatives.
25. Gordon Brown had the structural power and political influence to have driven the environmental agenda across Government but, like Blair, his priorities lay elsewhere
26. The Stern Report helped Brown to understand the economic significance of the issue, and the important linkages between the development and environmental agendas, but the main message he seems to have drawn from it is the need for international action, despite Stern making clear the need for domestic action too. Brown is likely to pick up where Blair left off in terms of the UK playing a leading role in international climate change diplomacy, but it remains unclear whether he will deliver substantive action at the domestic level.

Treasury

27. The Treasury is arguably the most powerful institution within Whitehall, and under Gordon Brown its influence was extended and strengthened, enforced by mechanisms such as the Comprehensive Spending Review and Public Sector Agreements. It plays a critical role in the environmental policy process, not only as the controller of public expenditure, but also because its approval is needed for almost every significant new policy measure.
28. The Treasury has, however, rarely used its power positively to tackle environmental issues. Many observers see it as obstructive to environmental policy and too sympathetic to business interests at the expense of the environment.
29. The environment has not been a spending priority for this Labour Government (or, indeed, any previous government). The environment budget remains tiny compared to the major spending departments such as health and education. In a political world where the size of budgetary allocations is of major importance, the

absence of a big settlement for the environment is a hugely significant symbol of its low position on the list of Treasury priorities.

30. More fundamentally, the relative paucity of the environmental budget is also a major barrier to more effective climate change and biodiversity strategies. Key areas where more spending could make a big difference include:
    - R&D and in nascent technologies, such as renewable sources of electricity, energy efficiency and microgeneration.
    - Home insulation and other domestic measures to improve energy efficiency.
    - An affordable, reliable and extensive public transport system.
    - The UK Biodiversity Action Plan – current spending is only about 50% of the estimated required budget of £677 million.
31. As most environmental policy involves regulation – even emissions trading is a combination of regulation and market mechanisms – the growing opposition of the Treasury to regulation in recent years has been an obstacle to several progressive environmental initiatives from different ministries.
32. In 1997 the Treasury issued a far-reaching and progressive 'Statement of Intent on Environmental Taxation', which declared that the Government's aim was 'to reform the tax system to increase incentives to reduce environmental damage' and it promised to increase the proportion of revenues gained from taxing environmentally damaging activities. However, although the Treasury has introduced some innovative measures, the share of environmental taxes as a percentage of GDP was lower in 2005 than in 1997.
33. The Treasury needs to relax further its understandable opposition to the hypothecation of tax revenues, as it did in transport policy where it allows money raised from local transport levies to be reinvested in public transport, which is a key principle underpinning the London congestion charging scheme.
34. The Treasury clearly regards tradable permit schemes as the most effective means of delivering climate change targets. The Renewables Obligation has created a market in Renewable Obligation Certificates. The UK ETS was the world's first emissions trading scheme. The Treasury has actively supported the EU ETS, promising tougher cuts than many other member states and strongly supporting the inclusion of aviation in the scheme. Emissions trading schemes clearly have a potentially significant role to play in reducing carbon emissions, but flaws in existing schemes and the recent volatility of the carbon price, indicate that the Treasury should not become overly dependent on one policy instrument.

Policy Implementation

35. Government planning has been repeatedly let down by failures in Departmental forecasting, particularly by the DTI.
36. The climate change and biodiversity strategies have both been characterised by numerous implementation deficits, whilst remedial action to address these problems has often been either tardy or unforthcoming.

Agreeing a Contract/Techno-fix

37. Tackling climate change will require major behavioural changes by UK citizens in almost every aspect of their lives – their homes, how they travel and their leisure activities. It will also require changes to infrastructure and institutions that currently favour powerful business interests. The Government will need to make brave decisions if it is tackle these challenges head on, but for the reasons identified above these solutions have not yet been forthcoming.
38. Rather than encourage this behavioural revolution, the Labour Government prefers to seek the silver bullet of a 'techno-fix' solution, such as nuclear power, or biofuels.

5.1. Introduction: Do Politicians Understand the Science?

This chapter examines why the Government has been unable or unwilling to design and deliver more effective environmental policies to fight climate change and biodiversity loss.

It is important to note that environmental problems pose some particular challenges for policy-makers. These include:

- the scientific uncertainty and complexity characterising many environmental problems
- the difficulty in achieving effective international collective action to deal with global problems such as climate change and biodiversity loss
- the long-term impact on future generations of problems like climate change
- the irreversibility of problems such as species loss or habitat destruction
- the cross-cutting nature of many environmental problems poses difficulties for government departments that are mostly based on a distinct policy sector

It is beyond the remit of this report to examine these characteristics in any detail (see Carter 2007: ch.7), but they contribute in part to some of the obstacles discussed below. In particular, the scientific findings reviewed in Chapter 2 underline the seriousness of climate change and biodiversity loss, yet Chapters 3 and 4 indicated many weaknesses in the Government's policy responses to these problems. One explanation for this shortfall could be that politicians don't understand the scientific evidence demonstrating the severity and urgency of these problems.

Yet there is no evidence of Government ministers or advisors denying the science of climate change. The Government has always accepted the central message that climate change is happening and that human activities are directly contributing to it. The unanimous view of the interviewees was, in Peter Madden's words, *'I don't think that Government inaction on climate change has anything to do with the science'.*

Moreover, the Government has responded quite positively, if sometimes a little tardily, to scientific advice. In 2000 the RCEP recommended that atmospheric CO_2 concentrations needed to be maintained below 550ppmv to avoid *'dangerous and destructive climate change'*. Three years later, this advice formed the basis of the Government's decision to adopt the 2050 60% emissions reduction target, making the UK a pioneer in setting such an ambitious long-term target.

However, the scientific consensus has moved on, but the Government has failed to respond. Over the last year, as discussed in Section 3.3.1, the publication of the major reports by Stern and the IPCC, alongside other important work by the Tyndall Centre and other groups, provides strong evidence that indicates the need for much tougher targets, a fact that the Government is aware of (see, for example, Defra 2003, p.2, HM Government 2006, p.13). This evidence suggests the target needs to be closer to 350ppm CO_2 as opposed to the Government's proposed 550ppm target .The publication of the Climate Change Bill, which will enshrine the 2020 and 2050 targets in law, makes it particularly important to ensure that these targets are sufficiently ambitious, but at the moment the Bill is still based on the Government's original 550ppm CO_2 target. The RCEP, in its response to the draft Climate Change Bill, recognises the need to review scientific developments and urges the Government to ensure that the existing targets can be changed subsequently through secondary legislation (RCEP, 24 April 2007). The RCEP has no immediate plans to review the scientific literature, but the Chair of the RCEP, John Lawton, has observed that *'The Tyndall Centre has made very good calculations and I trust their figures'*. In short, if the Government is to maintain its reputation for following the best scientific advice on climate change, then it should adopt a significantly more ambitious 2050 target for carbon emissions reductions.

It is also important to note that Government ministers, including Tony Blair, have been kept well briefed on the science of climate change. It was the Chief Scientific Advisor, Sir David King, who famously warned that the threat from climate change exceeded that from terrorism, and he has repeatedly warned ministers of the climate change threat: *'David King never leaves any of them alone, he has one on ones with them all'* (Stephen Hale). Certainly both DEFRA Secretaries of State have had no doubts about the climate change threat. Margaret Beckett has a scientific background that allowed her to grasp the science of climate change readily, and she maintained that interest in a role as Foreign Secretary. Several interviewees commented on the fervour with which David Miliband learnt about and embraced this issue, in speeches and on his personal blog: *'David Miliband has unquestionably grasped the science….Miliband knows urgent action is needed'* (John Lawton). The Environment Ministers, Michael Meacher and Elliot Morley, were also firmly convinced of the urgency of the climate change problem. Moreover, as John Lawton stresses, *'It is not just the politicians, the senior [DEFRA] civil servants get the science too'*. There have also been individual environmentalists in Cabinet, such as Robin Cook and Chris Smith, who have been strong proponents of action on climate change. In short, as several other interviewees affirmed, key Government environment ministers do *'get the science'* and, by implication, they also recognise the urgency of the situation.

However, across the rest of Government, whilst the science of climate change is not questioned, there is not the same collective recognition of the need for urgent action: *'I think they get the science but that doesn't necessarily mean they think that the urgency's there. I think the science debate in political terms is over and it is an implementation issue, but that doesn't mean to say it's any more likely to happen'* (Tony Burton). In particular, as John Lawton observed: *'In the DfT, DTI and Treasury, they haven't got the sense of urgency about the science at all. They are "in denial" in terms of what it means for policy, for example, no more airports, we can't keep widening motorways.* This complacency has undoubtedly been shaken over the last year or so, with the publication of a plethora of significant reports demonstrating the worsening situation and highlighting the costs of mitigation and adaptation. As a result all ministers are now much more 'on message' with regard to the perils of climate change, whilst the rhetoric of climate change seems to suffuse almost every government publication of any relevance to the issue. But, as Chapter 3 demonstrated, it has not yet filtered through into substantive policy change, particularly in the transport sector.

Biodiversity is in some respects a trickier problem to grasp than climate change. The UK, like other Western Governments, has long been a champion of protecting 'charismatic species', such as elephants, pandas and whales. Some politicians might recognise the various utilitarian and ethical arguments about the need to stop species dieing out or habitats being destroyed. Thus the Government has maintained an active role in international conservationist conventions and it has a reasonable record of responding to scientific concerns about domestic biodiversity loss. However, policy responses are often marginalised to conservation-specific issues and have not been integrated more broadly across all policy sectors, such as in relation to the proposed plans for new house building. This failing may be because politicians and policy-makers find it harder to understand that biodiversity is linked to the healthy functioning of ecosystems and the importance of this to human livelihoods and economic activities. Although the Government contributed to funding the Millennium Ecosystem Assessment and readily adopted the MA Goals, the messages about the fragility and importance of ecosystems are only slowly trickling down into DEFRA, DfID and the Treasury (EAC 2006d). Even if an individual minister, such as former Environment Minister, Barry Gardner, does *'really care about and understands biodiversity'* (John Lawton), it is reasonable to conclude that the implications of biodiversity loss as set out in the Millennium Ecosystem Assessment are not understood across Government (or, indeed, Parliament).

Overall, although the Government (and politicians more generally) still has to do some collective learning about the urgency of climate change and the full implications of biodiversity loss, it is clear that, particularly on climate change, there has been a good understanding of the scientific arguments and Tony Blair and his environment ministers have certainly recognised the need for urgent action. Yet, as Chapters 3 and 4 make clear, the policy responses have proved inadequate.

There are a host of reasons why scientific evidence may not lead directly to an appropriate 'correct' policy response.[19] Some lie with the nature of science and the way it

[19] For an interesting discussion of this question from the perspective of a scientist, see Lawton (2007).

is communicated to the wider public. For example, science is good at identifying problems, but not always so effective at providing clear answers. It may offer alternative solutions and can tell us about the *scientific* implications of these alternatives, but because science is also often ambiguous and open to interpretation, it sometimes struggles to provide politicians with a clear route map for solving a problem. Yet the science that underpins climate change and biodiversity loss is accepted by the Government, whilst international bodies such as the IPCC and the Millennium Ecosystem Assessment provide some very clear policy options. So policy-makers might reasonably debate the best ways of cutting carbon emissions, drawing on scientific, as well as economic, political, social and cultural arguments about, say, the relative merits of nuclear power or renewable energy as sources of electricity, but the bottom line is that they know that emissions must be cut.

It would seem, therefore, that to explain the weaknesses in the Government's response to the science of climate change and biodiversity loss, we need to look to other factors. The remainder of this chapter examines the issues and challenges that have shaped the Government's response to the environment under two broad categories: environmental politics and environmental governance. The analysis is based on a set of elite interviews with environmental experts in and around Government over the last ten years, supplemented by documentary analysis.[20]

5.2. Environmental Politics

The environment is obviously only one of many policy challenges facing any government. It has to compete with other pressing issues, including the economy, health, education, welfare, foreign policy, for attention and resources. There is little doubt that for most of the last decade, the environment has been a long way down the list of Government priorities. Several factors contributed to the low status of the environment.

5.2.1. The Party Politics of the Environment

The absence of party competition on the environment has been a major obstacle to the development of effective environmental policies. Where there is a crowded political agenda dominated by traditional issues, such as the economy, taxation and welfare, political elites are more likely to treat a 'new' issue such as the environment seriously if it becomes the subject of intense partisan rivalry. Before 1997, the environment had never been a high profile political issue or the subject of party competition in the UK and little has changed since Labour entered office – at least until the last year or so.

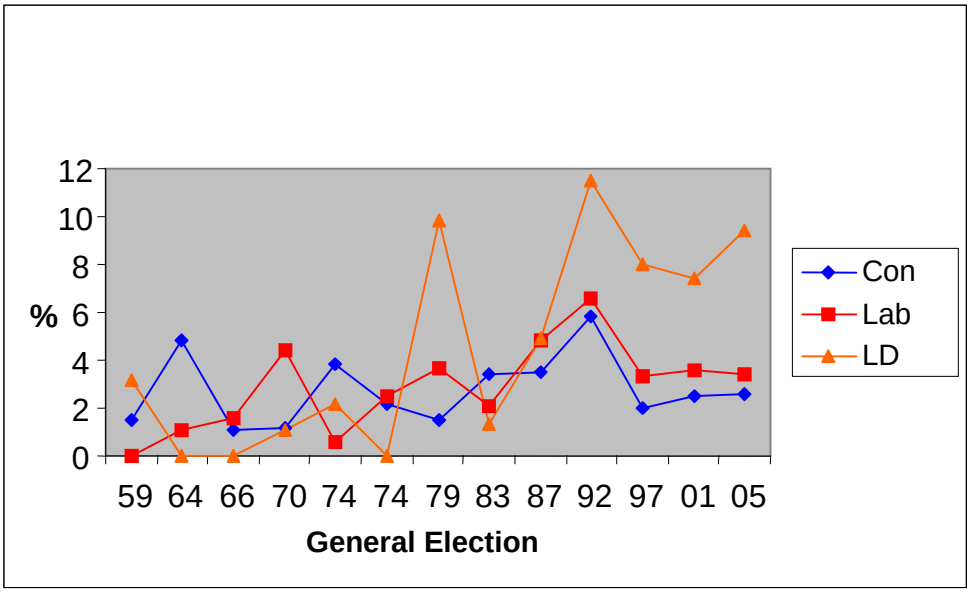
The environment is a *valence* issue - there is broad agreement across parties about the desired outcome, namely a better environment. But the environment cuts across traditional patterns of left-right partisan alignment, so it can be difficult for established parties to integrate environmental concerns into their policy programmes.

[20] Most of the extracts from interviews are directly attributed in the text simply by name. However, as some interviewees wanted some or all of their comments to be 'off the record', sometimes a generic term is used instead of a name so that such comments cannot be directly attributed.

Since the mid-1980s the Labour and Conservative parties have adopted a preference-accommodation strategy. They have gradually accommodated environmental concerns by adopting a greener rhetoric and developing moderate policies to demonstrate to the electorate that the environment would be safe in their hands. But party programmes remain underpinned by a strong commitment to economic growth and consumption, and established producer groups (both business and trade unions) continue to resist environmental initiatives that might be perceived to reduce competitiveness. By contrast, the Liberal Democrats, at least since the early 1990s, have adopted a more radical environmental programme and tried to compete on the issue, but as the third party they have struggled to shape the political agenda.

One crude indicator of the relative importance that parties attach to the environment is the proportion of the party manifesto taken up by environmental issues. Figure 5.1 shows that the Liberal Democrats have made the environment one of their main campaigning issues, whereas the Labour and Conservative parties have done little more than cover their backs on this issue, with Labour giving it a little more attention than the Conservatives.

Figure 5.1 Environmental Protection in Party Manifestos 1959-2005



Sources: Budge et al (2001) and Klingemann (2006).
The 2005 data was kindly provided by Judith Bara and Ian Budge.

An interesting feature of the party politics of the environment is that all parties seem particularly receptive to environmental pressure at the mid-term stage of the electoral cycle when public concern about the environment is often greatest, pressure groups are relatively influential and party leaders most receptive to different ideas. The best example of this phenomenon was the 1988-90 period when Margaret Thatcher made her speeches on the environment, the Green Party won 15% of the vote at the 1989 European Parliament election and all the parties published comprehensive environmental programmes. As Figure 3.1 shows, this positive response fed through into the 1992 manifestos.

Yet even these bursts of mid-term enthusiasm had dissipated by the time Labour entered office, with neither the Government nor the opposition parties focusing on environmental issues. In part, this reflected a decline in public concern: between September 1997 and April 2006, monthly Ipsos-MORI opinion polls always found less than 10% of the public regarded the environment as the most important issue facing the country, with the average throughout Labour's second term in office at just 3% (Ipsos-MORI 2007)**.** Environmental lobbyists trying to persuade politicians to take the environment more seriously met the response: *'that's not what the polls show, it's not what my voters are telling me, it's not what the newspapers are saying'* (Lobbyist, personal interview 2007).

The corollary of 'mid-termism' is a lack of interest at election time. To date, the environment has never been an issue of political significance at a UK general election; on the contrary, it has consistently disappeared in the campaign and is insignificant in shaping the way people vote. In 2005, only 2% of voters said it was the most important issue in the election (Whiteley et al 2005: 154). This low electoral salience means that politicians will concentrate their efforts – policy and resources – on the high profile issues and are unlikely to give the environment priority.

Another factor in the low party competition over the environment is the lack of sustained interest in the issue shown by Labour and Conservative leaders. Neil Kinnock and John Smith rarely mentioned the environment. Although Tony Blair has given increasing emphasis to climate change, especially in the last three years, he has displayed little enthusiasm for the wider environmental agenda. He was leader for two years before making his first speech on environmental issues, and Prime Minister for three years before making a keynote speech on the environment in October 2000. His declaration then that *'I want to push green issues back up the political agenda'* was an implicit acknowledgement of his government's failure to seize the environmental initiative during its first term – yet the issue had disappeared long before the June 2001 general election. Similarly four years later he rediscovered the environment in speeches during Autumn 2004, only to forget it by May 2005, when the environment counted for less than 1% of policy references in Blair's campaign speeches (Hobolt and Klemmensen 2005: 15).

Yet, Labour has had an easy ride on the environment because of the lack of opposition from the Conservatives. The two landslide Labour victories in 1997 and 2001 left the Conservatives as a weak, divided party. This increasingly Eurosceptic party was often critical of the progressive environmental legislation emanating from Brussels, which undermined its green credentials. William Hague ignored the issue; indeed, the Conservatives at this time presented a largely unsympathetic attitude to the environment. During the fuel protests in 2000 Hague praised the farmers and hauliers leading the action as *'fine upstanding citizens'*. In the 2001 election Hague's opening salvo in the campaign was to promise a sixpence per litre cut in fuel duty whilst his shadow chancellor, Michael Portillo, pledged to abolish the Climate Change Levy. During his brief tenure as party leader, Iain Duncan Smith did engage with environmental debates, declaring his support, for example, for the wider use of solar energy panels. But Michael Howard rarely

mentioned it; for example, the environment counted for less than 1% of policy references in Howard's campaign speeches (Hobolt and Klemmensen 2005: 15).

Thus Labour had an easy ride:

'If you go back to 1997 and you look at the quality of political opposition (a key constituent of quality in government), it was just hopeless, utterly hopeless. I can't honestly say that over the whole ten year period I can remember any incisive intervention from the Tory Opposition. Worse yet, given the well-earned reputation that the Lib Dems offer something bordering on leadership amongst the mainstream parties, I can't actually remember terribly much the Lib Dems did either'. (Jonathon Porritt)

The Cameron Effect

'Cameron has dramatically changed the situation'. (Michael Meacher)

'There hadn't been - until Cameron - any political capital to be gained really out of any of the environment. So you just needed to, you know, tick over and you'd keep ahead of the game'. (Tony Burton)

There have been several important developments in environmental policy – particularly climate change policy – since Spring 2006. One major reason for these changes has been the increased importance of the environment in UK party politics since David Cameron became leader of the Conservative Party, which has put pressure on the Government to respond in kind.

Cameron has made several well-publicised Green gestures, including his trip to the Arctic, his penchant for cycling to work (admittedly only once a week, with official car in tow) and his application for planning permission to fix a wind turbine to his house. More significantly, he has repeatedly emphasised the issue in his speeches and sought to reposition the Conservatives as a 'green' party to the extent that he launched the party's 2007 local election campaign with a 'Vote Blue, Go Green' slogan. Although there have been few concrete policy initiatives as yet, primarily because the Quality of Life policy group he appointed to develop a party environmental programme is still meeting,[21] Cameron has promised to increase the share of taxation raised by environmental taxes and he enthusiastically embraced the Friends of the Earth Climate Change Bill campaign.

Cameron has demonstrated that his interest in the environment is not a passing whim. Speaking in January 2007, John Gummer reflected that:

'The last six months certainly have been revolutionary, the world has totally changed, it is extraordinarily different. I am able to say to my Conservative colleagues things which I wouldn't have thought you could utter. We are going to propose things for our Commission which are so radical – and the Party's not going to oppose it'.

[21] Although it is interesting that one published Policy Group paper states that the current science indicates the need to increase the Government's 2050 emissions reduction target to 80% (Hurd and Kerr 2007).

Cameron has clearly identified the environment as a key part of his revisionist assault on traditional images of the Conservative Party – and an issue where he can hurt Labour:

'He's chosen the environment as a way of demonstrating how symbolically different the Conservative Party is'. (Stephen Hale)

'For Cameron it is not about winning votes in the narrow sense, but about re-branding the party'. (Peter Madden)

'It's interesting that he has picked that issue and stuck with it. He obviously now sees some political capital in it and that's all about defining himself as not the Tory Party of the past, it's a very useful symbolic issue from that point of view and he should run with it. And maybe it isn't an issue that fits naturally with Labour because of its difficult relationship with the social justice agenda. It's been unbranded so far so he can take it and shape it'. (Rebecca Willis).

It is a strategy that has already reaped some rewards. Our interviewees identified a clear and positive 'Cameron effect' on the party politics of the environment:

'Having Cameron out there, busy and by all accounts actually beginning to get his head round it quite seriously, speaking about it intelligently and with interest, that has certainly upped the ante'. (Jonathon Porritt)

'They didn't have the Opposition nipping at their ankles until recently, and it's very interesting what the Cameron effect has done, because they do have some opposition on the subject now and a combination of there being a high profile engagement from the Conservatives, along with the public mood having changed, for good reason, given what the science is saying on climate for example, suddenly they're finding themselves a little bit exposed and their record isn't that brilliant, and I think that's leading them to want to do things in a way that they haven't wanted to do for quite a long time'. (Tony Juniper)

Significantly, most interviewees argued that Cameron has put particular pressure on Gordon Brown, who recognised that he needed to strengthen his environmental reputation in readiness for his future confrontation with Cameron at the dispatch box. However, ever prudent, there are political reasons why Brown has hesitated to embrace a radical green agenda:

'Gordon Brown now feels he has to neutralise Cameron on the environment. He's not competing to outdo him, because I don't think he can – because Cameron can always just go for something else, because he's in Opposition'. (Labour insider)

'What's got the Chancellor more focused is the political pressure of David Cameron and the worry that Cameron could steal a march on him. I suspect there is only so far that he'll go and then he'll see whether Cameron's actually going to keep the support of the Conservatives. If he goes completely overboard and say's "OK, Cameron's adopted the

environment as his mantra and therefore I should", he might lose out because Cameron may not maintain the support of the Tory faithful'. (Sara Eppel).

Such comments are supported by the distinctly greener tinge to the 2006 Pre Budget, the 2007 Budget and subsequent announcements such as the promise to build five eco-towns. Many observers also speculate that Brown will have held back a number of initiatives for his first months in power. But Brown's dilemma is that whilst there are clear political benefits from being seen to be good on the environment, he is unsure whether it's worth the downside that he associates with it – namely the wrath of the business community or the wider public if he introduces unpopular regulations or eco-taxes.

It is clear that there has been a 'Cameron effect', but how permanent will it be? Will the current enthusiasm for the environment suffer from the 'mid-termism' that has seen previous flurries of interest in the environment disappear as the general election approaches? Much will clearly depend on the polls. If Cameron maintains and build on the current Conservative lead, then he will be in a stronger position to stave off the growing mutterings from within the Tory ranks against some of his more unpopular green ideas, such as increased green taxes.

There is no doubt that the more intense party competition over the environment has had a beneficial effect in terms of putting pressure on the government to introduce more stringent environmental measures.

5.2.2. The Labour Party and Environmentalism

There are further ideological factors that have constrained the willingness of Labour – 'old' or 'new' – to adopt a more progressive environmental agenda.

Traditionally, the closeness of the (old) Labour Party to the trade unions encouraged a focus on jobs and economic growth. Environmentalism was frequently dismissed as primarily a concern of the middle classes and many environmental measures were perceived as a threat to competitiveness and therefore jobs. These sentiments go right back to a Fabian pamphlet written by Tony Crosland (1971) in which he talked of the middle classes wanting to *'kick the ladder down behind them'* by focusing on threats to the countryside while displaying an indifference to urban decay and the material needs of the working classes. Nor have they disappeared entirely. Prior to the 2002 World Summit on Sustainable Development, Clare Short attacked Northern environmentalists for privileged and being 'anti-development' in wanting to impose their interests on the poor. Whilst the anti-environmentalism within the party has softened over the years, 'old Labour' politicians remain concerned by the social justice implications of some environmental measures, such as taxing domestic energy. Tony Juniper observed that, *'I've always had the feeling that a lot of figures in the Labour Party and in the Labour Government, had the suspicion that the environment is a middle class concern and that doing it properly will impact on people's welfare, especially poor people'*. Certainly, few 'old Labour' politicians have actively embraced environmentalism. Consequently, several interviewees commented that there was no pressure coming from within the party to give

greater attention to environmental issues – the grassroots party wasn't demanding more action.

New Labour, according to Mike Jacobs in a Fabian pamphlet written before he joined the Treasury as an environmental advisor to Gordon Brown, is *'fundamentally suspicious of environmentalism'* for espousing ideas that it regards as *'anti-aspirational'*. New Labour strategists believe the lifestyle compromises implied by many environmental policies are irrelevant and unappealing to its target voters: *'Middle England drives cars, enjoys shopping, wants to own more material things and to go on more foreign holidays'* (Jacobs 1999: 9). Blair's blunt - almost outraged - dismissal of calls to increase the tax burden on flying in January 2007 was a classic example of this sentiment.

New Labour is also keen to be business friendly: *'New Labour has a hard headed business kind of approach which is very much corporate bottom line, competitiveness and everything is subordinated to that, and the environment is regarded, well at best, something to be exploited and at worst a bit of an impediment'* (Michael Meacher). So New Labour has embraced the competitiveness agenda, intervenes reluctantly and in recent years it has developed an almost Thatcherite deregulatory zeal **(****see 5.** **).** The creation of the Department for Business Enterprise and Regulatory Reform, with most of the DTI's responsibilities intact, indicates that the highest levels of the party will continue to embrace business interests.

There are individual 'environmentalists' within the party, typically associated with the Socialist Environmental Resource Association. Chris Smith, as shadow environment spokesperson in opposition, was personally responsible for producing and driving through the relatively radical policy document 'In Trust For Tomorrow' in 1994, which encouraged most of the green lobby to welcome Labour's victory in 1997. Robin Cook was another longstanding environmentalist, whose views informed his ethical foreign policy statement within days of Labour taking office. Others have developed strong environmentalist sympathies in office, notably Michael Meacher, Margaret Beckett and, representing a younger generation, David Miliband. There are also a handful of MPs who sit on the EAC or have steadily pushed an environmentalist agenda.

But the environmental champions in the Parliamentary Labour Party are few in number. The bulk of the parliamentary party has had a low engagement with environmental issues. Thus the Government has come under very little pressure from the wider Labour Party – 'New' or 'Old', in parliament or beyond - to take a tougher stance on the environment.

5.2.3. The Environment as 'Bad Politics'

One universal difficulty with the environment as a policy issue is that the solutions to many problems involve policies that may be deeply unpopular with the public. The challenge is exacerbated by the impact of problems such as climate change, which will be far greater on future generations than on present generations. Although action is needed now, politicians have short-term concerns – tomorrow's newspapers, forthcoming opinion polls or the next election. They know how difficult it is to persuade people to accept self-sacrifice today in order to protect those who are not yet born. That challenge

is made even harder when it is clear that people in other countries are not being asked to make the same behavioural changes.

Political timidity has severely constrained the Labour Government's environmental policies, particularly in the area of transport. It is the primary explanation for the Government's reluctance to pursue taxation policies aimed at getting motorists out of their cars and dissuading people from flying: *'the moment that they were threatened by the lorry drivers on the fuel escalator, the moment anything was unpopular they retreated from it'* (John Gummer).

The fuel protests in 2000 deeply scarred the Government: *'it put the fear of God into them and it is used rather too frequently now as a justification for not doing much with transport'* (Sara Eppel). Brown hardly altered fuel duty for several years and only felt sufficiently confident to reintroduce the fuel price escalator in Budget 2007 – and even then the first increase was delayed by six months. The rapidity with which the petition opposing road pricing attracted almost 2 million supporters early in 2007 has made the Government similarly more nervous about this policy option.

The Government's aviation policy is driven by a political decision to give priority to peoples' aspirations to fly as often and cheaply as possible, and to ignore the climate change implications of a 'predict and provide' expansionist policy.

A non-transport example is the price of domestic energy. The 'green lobby' and the Environmental Audit Committee argue that higher energy prices are needed to reduce the demand for energy. But Labour learnt from the experience of the Conservative Government when it was forced into a major U-turn on its plans to increase VAT on domestic energy. Labour argues that it is a socially regressive tax that hits the poor and elderly disproportionately – indeed it reduced the rate on VAT in 1997. Increased taxes on domestic energy are not on the agenda, as one Labour insider observed:

'It would be a very brave politician who raised energy prices even if they cut income tax or other taxes. Energy taxes are very regressive and we've got a real fuel poverty problem – increases in fuel prices over the last two years have pushed another million people into fuel poverty'.

There is little doubt that this Government has been dissuaded from taking some tougher decisions, particularly in the area of transport policy, because it has assumed that it would be 'bad politics'. Whilst there is no doubt that some policies do provoke strong opposition, it is more questionable whether loud protests are always an accurate reflection of public opinion. Two million signatories in an organised campaign to exploit an online petition do not necessarily represent a majority, as indicated by the widespread acceptance of the congestion charging scheme in London. There is also plenty of polling evidence, for example, suggesting that a majority of the public accepts need for higher taxes on flying (Ipsos-MORI 2006; YouGov 2006).

Where there is extensive opposition – whether or not it is a majority – then this suggests that the government needs to adopt a much more active educational role in 'selling' the idea to the public, something it has been reluctant to do so far.

The 'Green Lobby'

The 'green lobby' consists of the main environmental groups – CPRE, RSPB, National Trust, The Wildlife Trusts, Woodland Trust, WWF, Friends of the Earth and, sometimes, Greenpeace – plus the Green Alliance, an NGO which seeks to put environmental considerations at the heart of decision-making. However, the low priority that the Labour Government has given to the environment suggests that the green lobby has had limited direct political influence over the last decade. Certainly, several interviewees expressed views critical of the strategy and tactics of the green lobby.

One widely held view is that the green lobby was initially quite soft on the Government. A huge amount of optimism was invested in Labour after 18 years of Conservative rule that had generally been unsympathetic to environmental issues. The green lobby had often struggled to get access to ministers, with the exception of the last Secretary of State for the Environment, John Gummer. In opposition Labour had the progressive 'In Trust For Tomorrow' environmental policy document and *'there was a good healthy dialogue between the NGO sector and the relevant parts of the front bench team, but it didn't extend beyond that'* (Guy Thompson). There were also close personal links, with prominent Labour supporters such as Fiona Reynolds Director of the CPRE and Barbara Young Chief Executive at the RSPB. The green lobby was therefore delighted to welcome a new government that appeared much more sympathetic to environmental concerns. The only NGO that did not welcome Labour with entirely open arms was Friends of the Earth, whose Director at time, Charles Secrett, wrote an article that was critical of Labour in Red Pepper magazine.

However, the relationship with the green lobby gradually deteriorated until a point was reached from around 2000 when there was very little dialogue at all between ministers and the green lobby. The first big confrontation between took place over GM crops, when the green lobby *'gave the Government a bloody nose'* (Guy Thompson). For its part the Government clearly felt let down on several occasions by the green lobby. According to Stephen Tindale, at the time political advisor to Michael Meacher, before becoming Executive Director of Greenpeace, *'The environmental movement was blamed inside government, and by Brown in particular, for failing to speak out loudly enough in support of government'* (Tindale 2006). For example, when Gordon Brown announced the planned introduction of the Climate Change Levy in 1999 he prompted a strong and sustained critical backlash from many parts of the business community, but the green lobby did not line up alongside the Government. Indeed, FoE and Greenpeace responded critically that it wasn't far enough or fast enough, but as one interviewee commented: *'Well that may be, but the fact is that the Government got a hell of a lot of flak from the CBI and they got flak from the green groups, so any self-respecting politician is going to say "well, why bother?"'* (Rebecca Willis). A year later, during the fuel protests, although the Government singularly failed to make the environmental case for high fuel duty, the green lobby again adopted a very low profile.

Several interviewees reported that between 2000 and 2005 the relationship between the Chancellor and the green lobby was quite frosty (see also Tindale 2006). Subsequently, a dialogue was restored around the time that Brown made a speech on climate change in March 2005 (his first major speech on the environment), but it is clear that Gordon Brown has been frustrated by his dealings with the green lobby. Several interviewees commented that from his perspective, every time Brown announces a new pro-environment measure, such as VED or doubling APD, it is met with the critical response from the green lobby to the effect that, *'it was a good start but he needs to do so much more'*. Interviewees commented that:

Brown saw introducing VED as a major and dangerous move, but he just got three weeks of negative press coverage.

The Treasury thinks that it is going out on a limb for doing some of this stuff and thinks that the green groups don't realise the political risks that are being taken on their behalf.

Another way of interpreting these observations is that those environmental groups that do adopt a critical perspective, such as Friends of the Earth, are simply doing their job by pushing their single issue loudly and firmly. Moreover, the loose alliance of a spectrum of both insider and outsider groups may actually help the 'establishment' groups, such as CPRE, RSPB and the National Trust, who are more willing to congratulate (as well as criticise) the Government, to get access to ministers, helped by the existence of the more strident voices in the wings.

Nevertheless, it is significant that that several interviewees commented that members of the Government had privately asked the green lobby to do what Jubilee 2000 did, namely to generate mass pressure externally on the Government that will force (or enable) it to respond. Certainly several interviewees were very critical of the green lobby, arguing it needed to be far more politically astute:

'Where the NGOs have been most ineffective has been around demonstrating the political will for change and the support for the agenda and, and reaching out beyond its own constituency and its own kind of membership base to demonstrate where people are willing to change their behaviour and helping to demonstrate how if we can raise awareness and make it easier for people to change their behaviour, that people would be prepared to engage.' (Guy Thompson)

One interviewee compared the climate change lobby unfavourably with the development lobby. In the run-up to the 2005 Gleneagles G8 summit, whereas the development NGOs were able to demonstrate to the Prime Minister that they had mobilised a massive international coalition to lobby in several G8 countries and would have a mass demonstration in Edinburgh, the climate change lobby struggled even to coordinate a domestic coalition, let alone international action. So, '*the Prime Minister ends up worrying about the things that were being objected to by the 250,000 people who are in*

the middle of Edinburgh' (Stephen Hale), rather than the much lower profile climate change NGOs.

One outcome of these failings was the formation in September 2005 of the Stop Climate Chaos coalition of UK environmental, faith and development groups to generate this kind of mass pressure on the government.

This Government is very media conscious so it needs reassurance that when it does act, *'it won't get its hand bitten off'* (Stephen Joseph) It wants to show it is responding to mass pressure – hence the request to mobilise mass support. It also likes to be sure that new policy measures will have wide support, illustrated by the RAC/Transport 2000 joint letter calling successfully for an extra VED band for the biggest gas-guzzling vehicles in 2006 (Stephen Joseph).

Of course, it is easy to argue that the science should be forcing the Government to act more proactively on climate change and biodiversity irrespective of the existence of this kind of political pressure. But, as already noted, the Government faces multiple and conflicting priorities, many with more immediate consequences than climate change, so political reality suggests that the more pressure that can be placed on the Government, the harder it is not to act.

Business Interests

This report demonstrates that business interests have frequently succeeded in preventing or delaying Government action to address numerous environmental problems or have managed to dilute proposals that initially imposed significant costs on business interests. However, in identifying the business sector as a major constraint on action, it is important not to treat business as a monolithic entity and not to dismiss all businesses as an obstacle to progressive action.

The negative impact of business community takes both general and specific forms. The CBI, as one important representative of business, has consistently lobbied Gordon Brown hard on what it regards as the excessive level regulatory burden (not just environmental) on British industry. As one interviewee observed, '*There's the perception which is pretty widespread in the Government, which is that if the CBI doesn't agree with it, it must be a bad thing for British business, and regulation is the totemic example of that'* . More specifically, the CBI and sectoral trade associations have pushed hard in support of a wide range of policies that have negative implications for the environment, including:

- The road lobby 'twelve foot wide' campaign in the run-up to the 2004 Comprehensive Spending Review that helped win a good financial settlement for road construction.

- The aviation industry (business and trade unions) have been effective at creating a narrative which says that anything other than a 'predict and provide' policy discriminates against the poor, (even though this argument that is demonstrably false – see Cairns and Newson 2006).

- The construction industry was effective in watering down the 2005 reform of Building Regulations.

- The powerful construction industry has lobbied effectively in support of house-building plans and reform of the planning regulations.

- The biotech and agri-environment industries have had the ear of the government in shaping its pro-GM stance.

- There is a strong corporate pro-nuclear lobby representing major companies in the energy and construction industries.

Conversely, the classic business response to many environmental protection proposals is still knee-jerk opposition. Where Government action is mooted the business lobby will typically push first for a voluntary agreement over a regulation or an MBI. If it becomes clear that a Government policy measure will result, then business will focus its efforts on watering down the proposals – as with the Climate Change Levy. Failing that the preference seems increasingly to be for some kind of tradable permit system, which is hardly surprising as both UK ETS and EU ETS have resulted in massive windfall payments to many companies. The current strong support in Government for emissions trading as the best solution to bringing down emissions in the energy, business and aviation sectors is probably partly explained by the willingness of business to embrace this approach.

However, business interests do not always hold sway, nor are they always opposed to environmental interests. Certainly over the last 15-20 years some of the producer-dominated policy communities that traditionally shaped policy-making in sectors such as agriculture, transport and energy, have opened up, allowing environmental and consumer NGOs more access to the policy process. The road lobby, for example, is much weaker since the anti-road protests of the 1990s. The British Roads Foundation is no more, although the Freight Transport Association is strong and well resourced. The traditional agricultural policy community of MAFF and the NFU, which dominated farming policy from the 1940s, has slowly unwound, hastened in recent years by the replacement of MAFF with the more environmentally concerned DEFRA and the CAP reforms that turned land stewardship into a lucrative business.

The CBI remains an influential group, perhaps more so under a Labour Government keen to be seen to be business-friendly than with a Conservative Government: *'Labour finds it difficult to do things that upset the CBI because they lack the self-confidence to do so'* (Stephen Hale). But the CBI does not represent all businesses - it tends to speak for mainstream medium and smaller businesses, and consequently rarely adopts a progressive line on environmental issues. Industry trade associations, when negotiating the details of measures with Government ministers and civil servants, often end up adopting the lowest common denominator position (i.e. least progressive) to carry their members with them

However, not all business interests adopt anti-environmental positions. Some corporate leaders grasped the nettle of climate change several years ago. The Corporate Leaders Group on Climate Change, which emerged from the Prince of Wales's Business and the Environment programme, is a group of business leaders that seems to have influenced Blair. Several interviewees commented that Blair was genuinely surprised by their June 2006 letter and lobbying, which called the Government to provide a clear and ambitious framework for the *'transition to a low carbon economy'*, even if that involved much more challenging ETS carbon reduction targets and tougher regulations. Sara Eppel believes that *'This group has changed the agenda, there's no doubt about that. The fact that the high level, big companies can come to Government and say you're not doing enough, we are doing it anyway, is really good'*. This lobbying is likely to have contributed to the Government's decision to introduce the Climate Change Bill, with its proposal for carbon budgets. In short, business leaders want the stability and certainty to allow them to plan and invest in becoming greener without losing competitiveness.

This shift in business attitudes seems to have gained further momentum since the publication of the Stern Report, which underlined the economic case for action. Peter Madden, who as Chief Executive of Forum for the Future, works closely with business, identified *'a real sense of sea-change'* in business attitudes. Some companies recognise a fundamental threat to their business model: BP knows that its core business of fossil fuel extraction and distribution has a finite lifespan, and has even relabelled itself 'Beyond Petroleum'. Others have embraced the 'ecological modernisation' message that 'pollution prevention pays', with money to be made from investing in greener technologies to cut energy use, reduce waste or even just to develop a greener image. But an increasing number of business leaders have just grasped the need to take the lead in addressing climate change as an urgent global problem. Thus there has been a flurry of initiatives, including:

- Marks and Spencer announced a five year 100 point environment plan, including a climate change strategy that includes pledges to cut energy use in stores by 25%, improve fuel efficiency in warehouses by 20%, power all stores by electricity from renewable sources, run all lorries on at least 50% bio-diesel and cut food miles dramatically.
- The Co-op has a target of cutting energy consumption by 25% by 2012 and it will soon stop selling traditional tungsten filament light bulbs and will stock only the highest rated energy efficient white goods.
- Sainsbury's have a set of emission reduction and waste reduction targets.
- Tescos has embarked on an ambitious labelling initiative that will eventually allow consumers to compare products by their emissions levels.
- First Group aims to reduce its train emissions by 20% and bus emissions by 25% by 2020. Other

The significance of these kinds of development should not be underestimated. As Jonathon Porritt observes:

'If Government understands that business is not automatically in its defensive bunker saying "no, no no, we can't do that", or "you'll be in trouble if you do that", they come to see that business is differentiated and begin to work with the leadership voice, then they will come up with some very different policies from the ones they tend to in the CBI dominated environment today'.

Of course the reality is that both kinds of business voice can be heard – and several more in between. These environmental leaders in each business sector remain in a minority, and beyond the middle of the road organisations there are also, as one interviewee put it: *'the bloody laggards, the ones who are continuing to transgress against basic environmental legislation, of failing to meet essential standards'.*

The challenge for the Government is to do a certain amount to encourage and reward the leaders in each sector, but its primary job is to drive change in behaviour into the mainstream of each sector and amongst the laggards. It can do so directly through a combination of regulation and market based instruments, but it must also provide the infrastructure to allow businesses to make these changes – currently, for example, BT's efforts to increase the amount of energy it takes from renewable sources is limited by the non-availability of sufficient renewable sources! It will not be easy, but there is currently an unprecedented 'window of opportunity' to win the support of business for more progressive environmental measures.

5.3. Environmental Governance?

5.3.1. External Influences: International Treaties and EU Membership

UK environment policy is influenced to a significant extent – and generally in a positive way - by various multilateral environmental agreements and membership of the EU.

The Kyoto emission reduction target itself has not been a powerful driver in the UK because the 'dash for gas' in the early/mid 1990s has meant that the Labour Government has always been confident of meeting its Kyoto commitment. However, this confidence prompted Labour to set a tougher domestic target, which has had an important impact on domestic policy (even though it will not be met), and it has also enabled the UK – and Tony Blair in particular - to become an international leader in climate change diplomacy. The EU's commitment to Kyoto has been a driver for several important targets and initiatives. The 2020 targets to reduce EU greenhouse gas emissions by at least 20% compared to 1990 levels and for 20% of EU electricity to come from renewable sources should prove a positive stimulus for UK action. The EU Emissions Trading System and the voluntary agreement with car manufacturers are positive initiatives that the UK Government could not emulate alone, although flaws in both underline the limited influence that the Government can exercise over two key elements of UK climate change policy.

UK biodiversity policy, both domestically and internationally, continues to be positively influenced by a range of biodiversity-related treaties, such as RAMSAR, MARPOL and OSPAR. The UK strongly supported the Millennium Ecosystem Assessment, and its

findings are slowly starting to influence domestic and international policy. However, the EU plays the most important role in shaping UK policy, notably the Gothenburg agreement to halt biodiversity loss by 2010, key nature conservation directives on habitats and birds and the Natura 2000 protection system, and a range of other related initiative such as the water framework directive. It is often observed that around 80% of UK environmental legislation emanates from the EU. Although this figure may exaggerate the situation, because EU legislation often fits in and around areas where the UK already had established policy frameworks, there is no doubt that EU legislation plays a significant role in domestic biodiversity policy (Fairbrass and Jordan 2001). Conversely, the Common Agricultural Policy and Common Fisheries Policy have caused extensive biodiversity loss, yet the Government is severely limited in taking remedial action by the slow pace of reform.

5.3.2. The Lack of Joined-Up Government

Despite a plethora of initiatives to improve the integration of environmental policy-making, policy measures in different Departments frequently fail to take adequate account of environmental objectives or often contradict policies made elsewhere.

At its worst, this lack of integration on climate change underpins major strategic documents, such as the DfT's Aviation White Paper where a 'predict and provide' approach prioritised economic growth over emission reductions and its 2004 Transport White Paper, which set out a renewed commitment to road building. Another glaring example is the UK Export Credit Guarantee Department, which provides loans, guarantees, credits and insurance to private corporations to help them do business abroad, particularly in less developed countries. In 2006 it provided over £2 billion primarily to support the supply of aircraft and hydrocarbon extraction, such as oilfields (WWF 2006). Biodiversity suffers from the DCLG house-building programmes on greenfield sites and from DfID's marginalisation of biodiversity issues. Treasury taxation policies have allowed duties on road and air travel to decline in real terms since 2000-01.

Why has environmental policy integration (EPI) proved so elusive? The cross-cutting nature of environmental problems poses a particular challenge for the administrative structure of the UK government, in which ministries are based on distinct policy sectors. These individual ministries typically engage in a blinkered pursuit of narrow sectoral objectives with little consideration for their environmental impact. Thus the Department for Transport has traditionally adopted a 'predict and provide' approach to road building and throughout the post-war era the old Ministry of Agriculture, Fisheries and Food (MAFF) had encouraged intensive farming methods. Meanwhile, from 1970 until 1997, environmental responsibilities were largely, but not entirely, hived off to the separate Department of the Environment, which, despite its name, devoted most of its resources to its local government and planning portfolio.

There is little dispute that effective environmental policy requires an active commitment to the concept of 'environmental policy integration' (EEA 2005), which encompasses two forms of integration. Horizontal integration is the extent to which a central authority has developed a comprehensive strategy to deal with cross-sectoral problems like climate

change and biodiversity. Vertical integration is the extent to which a ministry has adopted and implemented environmental objectives as a key feature of its portfolio. Labour's 1997 manifesto stated that *'concern for the environment will be put at the heart of policy-making'* and initially the new Government seemed to embrace the principle of integration more fulsomely than its predecessor.

The principal means of securing greater horizontal policy integration has been through reforms of the machinery of government. Most important were the decisions in 1997 to create a new Department of Environment, Transport and the Regions (DETR) and in 2001 to form the Department for Environment, Food and Rural Affairs (DEFRA).

The DETR 'super-ministry' was an explicit attempt to bring transport and planning issues into the heart of environmental decision-making, under the control of the Deputy Prime Minister John Prescott. It was a move welcomed by environmentalists, such as Friends of the Earth, who believed that a unified department would think and act in a more integrated manner. However, the dismantling of DETR four years later partly reflected the widespread perception in and around Government that this super-ministry had proven unmanageable and that little real integration between the two parts of DETR had occurred, with transport remaining a distinct entity that was culturally resistant to the incorporation of environmental objectives.

'Gus McDonald authorised 77 local authority road building schemes in one go, but the first time people on the environment side of the DETR knew about the 77 schemes was when they read the press release. So much for integration.' (Stephen Joseph).

In part, too, DEFRA was a way of reinvigorating the mess that was MAFF, a beleagered department after being battered by a series of major crises: BSE, GMOs and foot and mouth. At a personal level – a key element in many machinery of government upheavals – adding the environment portfolio to MAFF was a way of persuading Margaret Beckett to accept the post of Secretary of State. Notwithstanding the much-publicised error over the Rural Payments Agency, DEFRA has established a reasonable reputation, particularly in the way it has gradually integrated the different groups within the Department. The biodiversity community in particular emphasise the environmental benefits to be gained from the integration of the farming and environmental portfolios, with DEFRA contributing positively to the current dialogue between Government and the farming industry about the future of farming.

Yet most observers believe that, on balance, the creation of DEFRA was a mistake. At a political level, DEFRA lacks the clout that DETR was able to exercise: *'DEFRA's ability to promote environmental and sustainable development objectives among other departments seems to be significantly less than that of the DETR. One might doubt, for example, whether the Aviation White Paper would have taken the form it did had DETR survived'* (EAC 2004c**:** para.84). This is a view endorsed by several interviewees, for example:

'With DETR environment was part of one of the biggest, wealthiest Departments in

Whitehall. When we had rows everyone listened. Then it was put into one of the smallest, weakest and poorest Departments in Whitehall. It knocked the environmental agenda and the delivery on the environmental agenda for six. DEFRA has many fewer levers to pull'. (Peter Madden)

Several interviewees argued that the separation of planning (now inDCLG) and environmental responsibilities made little sense: *'The planning system is the principal non-fiscal, non-regulatory tool for accomplishing environmental outcomes. So it is completely stupid to separate the arms from the head'* (Tom Burke).

'Losing that connection between the land use planning system and the environment is something we're really still struggling with'. (Guy Thompson)

Generally, despite the problems DETR endured, in its four-year lifespan it did result in some improved synergies between transport and environment, and with transport as the sector where emission reductions have been hardest to achieve, the logic underpinning DETR made sense.

Alongside these attempts to improve the integration of the machinery of government, devolution saw the removal of many environmental responsibilities to the new devolved bodies, creating many administrative complexities.

In England, the replacement of English Nature, the Countryside Commission and the Rural Development Service with Natural England was justified in EPI terms as creating a one-stop shop, although critics fear the loss of English Nature, which was regarded as a champion of the natural environment.

As part of its sustainable development strategy, the Government also established several administrative mechanisms that were intended to improve environmental policy integration, including:

- An Environmental Audit Committee (EAC) to scrutinise the extent to which environmental concerns were being integrated into government policy

- The existing Ministerial Committee on the Environment was upgraded to Cabinet status. In 2005, it became the Energy and Environment Committee (EE) and it is now chaired by the Prime Minister. It has a sub-committee called EE(SD) consisting of the departmental Sustainable Development Ministers (formerly Green Ministers).

- A cross-departmental Sustainable Development Unit located in DETR (later DEFRA)

- The Sustainable Development Commission was established in 2000 as an independent advisor and 'critical friend' on sustainable development. It was given a stronger watchdog role in the 2005 Sustainable Development Strategy,

monitoring Government progress on sustainable development.

- A set of 15 headline indicators of sustainable development supplemented by a suite of 147 indicators, with annual monitoring reports to evaluate progress towards SD against the headline indicators. The 2005 SD Strategy focused instead on 68 Strategy indicators, which include 20 key Framework indicators.

- Public Service Agreement targets set by the Comprehensive Spending Reviews

On paper, the UK boasts an impressive set of administrative structures and mechanisms aimed at enhancing both horizontal and vertical integration; indeed, the OECD (2002) singled the UK out for praise in an international survey. In practice, the picture is less impressive. An EAC assessment of the implementation of the 1999 sustainable development strategy found that it had failed to drive environmental progress as envisaged, whilst individual initiatives, such as the indicators of sustainable development and PSA targets, had exerted only limited impact. For example, the 2002 Spending Review resulted in just four environmentally related targets out of 160 PSA targets (EAC 2004c: para.55). The impressive work of the EAC and SDC has been used widely in this report, but it is unclear how much influence these independent bodies have exercised over the Government. Ross (2005: 38) claims that many EAC recommendations have been accepted by the Government. The SDU seems to have had a limited impact, and many commentators criticise its placement in DEFRA, arguing that it would have more influence if placed, for example, in the Prime Minister's Office or Cabinet Office (EAC 2004c; Ross 2005: 39).

The absence of vertical integration is indicated by the failure of policy-makers in each sector to consider routinely the environmental consequences of their actions. One explanation is the weak approach to environmental policy appraisal, which is rarely carried out according to DEFRA best practice and usually results in a simplistic ex-post justification for unsustainable policies (Russel and Jordan 2006). The replacement of these appraisals with RIAs is likely to downgrade environmental considerations further as the emphasis is on cutting the regulatory burden on business.

In short, despite the worthy efforts to improve integration in practice little has changed. Interviewees repeatedly talked about the departmental 'silos' – DEFRA, DfT, DTI, DfID, Treasury - that impede horizontal environmental policy integration.

It is important to note that there is also a distinctively New Labour aspect to this lack of environmental integration. The well-known conflict at the heart of the Labour Government between Tony Blair and Gordon Brown has had a negative impact on environmental policy. As one eminent scientist observed, *'I think the biggest single problem is a lack of joined-up government, which begins at the top in our present Government. The top two people are not joined up. …If you haven't got joined up Government at the top, you can't have it down at the bottom'* (John Houghton).

The situation has not been helped by Tony Blair's style of government, with its focus on

bilateral discussions with chief ministers and a downgrading of Cabinet discussion. Michael Meacher commented that *'Blair tends to operate bilaterally with his chief Ministers and there's very little inter-departmental discussion, certainly at Ministerial level'*. This approach has limited the degree of inter-departmental discussion, which is hardly conducive to coordinated environmental policy: Further down the line, it seems that the good, regular flow of information between Departments that is an essential prerequisite for integration is absent. Individual departments often lack the information – let alone the inclination – to consider the environmental impact of their policies in other policy sectors.

It is too early to say whether recent efforts to improve policy integration on climate change will be successful. A new Office of Climate Change, announced in October 2006, to coordinate climate change policy across government has seven Departments sitting down regularly to talk to each other and the Prime Minister. The Climate Change Bill, with its commitment to carbon budgets and regular reporting, is also intended to strengthen accountability across government. However, when forming his first Government, Gordon Brown did not implement the strongly rumoured transfer of energy responsibilities from DTI to DEFRA

Finally, it is significant that several interviewees argued that the importance of machinery of government changes should not be overstated:

'You don't solve why environment isn't higher up the political agenda just by restructuring' (Tony Burton).

'Fabulous machinery on paper, but concentrating on fine tuning as if that was going to deliver doesn't solve the problem of political will - the Government can talk to itself in ever more perfect ways but it doesn't matter if no one is listening' (Peter Madden)

What matters, and what has been absent in the view of many interviewees, is political leadership.

5.3.3. Political Leadership

'We've had a disconnect between what Blair has done about the challenges for the world, our children's future and so on, and his willingness to take any actions or decisions at home' (Peter Madden)

The design and delivery of effective policies to address cross-cutting problems such as climate change and biodiversity loss requires visible, committed and sustained political leadership to drive these strategies across government. Under Labour, domestic environmental policy has continued to suffer badly from the absence of such leadership. One consequence is that individual departments such as transport have continued to marginalise environmental concerns. Another is that potentially unpopular policies such as fuel duty increases, road pricing and aviation taxes have been avoided because no one in Government has been prepared to 'educate' the public about how we need to move towards a low carbon economy and how that requires behavioural change by everyone.

At key junctures, such as the fuel protests, no one in Government came out and said that these were necessary environmental taxes. Indeed, Tony Blair undermined Miliband's efforts to put pressure on the aviation industry with his infamous comments about his family's right to take regular long haul flights.

Two people in Government could have provided the necessary strategic leadership: Tony Blair or Gordon Brown, yet most interviewees commented on the absence of domestic political leadership from either of them.

Tony Blair has never shown much interest in the environment in general terms. Although he has long recognised that climate change is a major global issue, he only really grasped the nettle around 2004-05 and then his focus was firmly on the international arena. With the exception of his support for nuclear power, Blair rarely showed any inclination to get personally involved in the nitty-gritty of the domestic policy process. Indeed, his clear distaste for policies that might interfere with the 'freedom' of individuals to fly or drive as much as they want, probably in part explained his support for the 'techno-fix' nuclear solution (see XXX).

One early indication of the low importance Blair attributed to the environment, was the appointment of Michael Meacher to the non-Cabinet post of Minister of the Environment in 1997. Meacher was an 'old Labour' left-winger who, as a member of the shadow cabinet should, by right, have been allocated a cabinet seat – he was clearly an outsider. Although Prescott was overall Secretary of State for DETR and was deeply committed to transport reform, domestic environmental issues were largely left to Meacher. Although he had no background in the environment, Meacher quickly mastered his brief and rapidly gained the respect of the environmental lobby, but sitting outside the Cabinet he could exercise little influence over the rest of the Government.

Under Margaret Beckett, a political 'safe pair of hands' charged with sorting out the former MAFF following the foot and mouth crisis, the profile of the environment remained low. Beckett was undoubtedly interested in the climate change agenda, but the timidity of the 2006 CCP reflected the failure of DEFRA to bring other departments, notably DfT, into line. Since becoming Foreign Secretary, she has backed the Prime Minister's international efforts by, for example**,** forcing the UN Security Council to debate climate change as a major security threat. However, it took the appointment of David Miliband as Secretary of State for the Environment in 2006 to provide some real domestic leadership on the issue. His task was made easier by the general rise in the profile of climate change since early 2006 and the impact of the 'Cameron effect' on domestic environmental politics. In this context, Miliband, the most dynamic Labour minister to hold the environment brief, was able to exercise some influence across Government, securing legislative time for the Climate Change Bill and support for several other initiatives. However, his efforts to mobilise support for an increase in green taxation, seem to have encountered some resistance from the Treasury.

Gordon Brown had the structural power and political influence to have driven the environmental agenda across Government, but he too has failed to do so. Like Blair, his

priorities lay elsewhere. Indeed, it was some eight years after he became Chancellor that he made his first keynote speech on environmental issues. One interviewee observed that on the environment Brown is still in the 'foothills', in terms of grasping the issue. The Stern Report has helped him understand the economic significance of the issue, and there is evidence that he increasingly sees the importance linkages between the development and environmental agendas. But he message he has drawn from it is the need for international action - despite Stern making clear the need for domestic action too – and we can reasonably expect him to pick up where Blair left off in terms of the UK playing a leading role in international climate change diplomacy.

The absence of domestic political leadership from Blair and Brown is understandable in the wider political context. To drive any policy through the political process and the governmental bureaucracy requires considerable political capital, but Blair and Brown both chose to give priority to other issues or had more urgent demands on this precious commodity. In the first term in particular, the priorities of the Labour Government were those core manifesto issues that the wider party was united around, such as improving public services, constitutional reform and ensuring economic growth and stability. In the second term foreign policy and its domestic implications increasingly distracted the Prime Minister. Nor was there much pressure on the leadership coming from either the parliamentary or wider Labour Party to prioritise environmental issues. The party wasn't hostile to the environment, it just did not see it as a priority.

This situation has changed in the last year or so, but it is not yet clear whether things have shifted sufficiently to persuade Gordon Brown to provide the kind of domestic leadership on the environment that Michael Meacher calls for:

'If the Prime Minister insists on banging heads together, insisting that he wants to see co-ordinated effort, and if he says that if DTI or Transport come up with a proposal it only gets through if it is agreed by DEFRA, that would change the balance of power in Whitehall overnight'.

5.4. Treasury

The Treasury is arguably the most powerful institution within Whitehall, and under Gordon Brown its influence has been extended and strengthened, enforced by mechanisms such as the Comprehensive Spending Review and Public Sector Agreements. It plays a critical role in the environmental policy process, not only as the controller of public expenditure, but also because its approval is needed for almost every significant new policy measure.

However, Stephen Hale, director of Green Alliance has observed, *'the Treasury's power has too rarely been used to further environmental objectives. Its tremendous drive and intellect has been used more negatively than positively, finding fault with initiatives born elsewhere in Whitehall rather than developing home grown solutions'* (Green Alliance 2006: 3). It is a sentiment that reflects many of the critical comments made in Environmental Audit Committee reports over the last decade and those of most of the interviewees. For example:

'It's not fair to say the Treasury is THE block but I think it is fair to say that more initiatives and progressive policy positions have fallen foul of Treasury than anywhere else and that's for a host of different reasons, interesting reasons. But a lot to do with the way Gordon Brown has chosen to run the Treasury and to control things very tightly and the way in which the case has to be made for a particular policy development in very strict economic terms, often quite differentiated from the political reasons why you might actually do something.' (Jonathon Porritt)

'The Treasury has certainly been the Department that's been most sympathetic to the kind of lowest common denominator lobbying from business. Where there has been brokerage on key issues, such as the [2003] White Paper, it's been the Treasury that has dragged things backwards and watered it down. It's been a barrier to progress across Government.' (Guy Thompson)

'The Treasury basically has the veto and they use that veto from the very beginning of a policy process all the way through. So it's not even just that the Chancellor will say no, it's actually that the officials will say to the Department you cannot do any analysis on any policies to do with economic instruments for environmental uses. So they actually forestall any evidence gathering'. (Sara Eppel)

To explore this claim in more detail, the role of the Treasury in environmental policy is divided into three elements: public expenditure, regulation and the use of market based instruments.

Public Expenditure

The environment has not been a spending priority for this Labour Government (or, indeed, any previous government). The environment budget remains tiny compared to the major spending departments such as health, education, social security, criminal justice system and defence. In a political world where the size of budgetary allocations is of major importance, the absence of a big settlement for the environment, notably DEFRA, is a hugely significant symbol of the environment's low position on the list of Treasury priorities.

It is a point forcefully made by Tom Burke who despairs that this issue is rarely debated:

'In 2004, we spent some £245 billion on health, education and social security. We spent about £54 billion on internal and external security and about £7.5 billion pounds on the environment. In other words, we spent a great deal on maintaining the social conditions for prosperity and practically nothing on maintaining the environmental conditions'.

Burke argues that a bigger environmental budget would send out an important political message. The big spending departments are generally seen as more attractive to politicians than those with a smaller budget. If DEFRA were to receive a bigger budget, then it would be one factor in attracting more able politicians – such as David Miliband – who could then exercise greater power battling for the environment within the Cabinet.

More fundamentally, the relative paucity of the environmental budget is also a major barrier to more effective climate change and biodiversity strategies. It is often claimed that money is not the key issue in environmental policy, and it is undoubtedly true that much can be achieved without government expenditure; indeed, the bulk of current environmental policy takes the form of regulations. However, some environmental measures do need significant public expenditure. Examples of areas where the Government could spend (more) money to great effect include:

- There could be much greater investment in R&D and in nascent technologies, such as renewable sources of electricity, energy efficiency and microgeneration. The Treasury clearly recognises the case for investment in these areas – which is supported by the Stern Report (2007: ch.16) - as illustrated by its existing support for them through grant and subsidy schemes, but the amounts invested in such programmes are generally tiny both in absolute terms and relative to several other EU15 member states.

- To move towards a low carbon energy supply system requires considerable upfront investment in the infrastructure (notably the pipes) necessary to support decentralised energy systems and community/district heating schemes.

- A significant increase in spending on home insulation and other domestic measures to improve energy efficiency would gain the combined benefits of cutting carbon emissions, reducing fuel poverty, lowering energy bills – and creating jobs!

- If people are to be coaxed out of cars and aeroplanes, then they need the carrot of an affordable, reliable and extensive public transport system. Real improvements can be achieved through relatively cheap options, such as ‘smart choices’ and support for cycling and walking. But major improvements to infrastructure, such as new railway lines and trams, and to rolling stock require huge investments that in whole or in part will inevitably come from the public purse. One reason for the collapse of Prescott’s ambitious transport strategy was the sheer cost of light rail schemes, which the Treasury deemed poor value for money.

- Current spending on the UK Biodiversity Action Plan is only about 50% of the estimated budget required of £677 million.

- Expenditure of just £15 or 16 million per year could have a major impact on reversing the loss of precious biodiversity in the UK Overseas Territories.

Spending more on the environment is obviously a political decision that should involve the whole Government, not just the Treasury, although under Gordon Brown, the Treasury has kept very tight control over all budgetary decisions. Nonetheless, it is also incumbent on the Department of Transport, for example, to authorise a major switch in planned spending away from roads and aviation into public transport.

The Treasury needs to relax further its understandable opposition to the hypothecation of tax revenues, as it did in transport policy where it allows money raised from local transport levies to be reinvested in public transport – a key principle underpinning the London congestion charging scheme.

Regulation

As most environmental policy involves regulation – even emissions trading is a combination of regulation and market mechanisms – the growing opposition of the Treasury to regulation, particularly since the launch of the 'Better Regulation' initiative in May 2005, has been an obstacle to numerous environmental initiatives from different ministries.

Gordon Brown, in the face of fierce lobbying by the CBI, has undoubtedly been influenced by the familiar business mantra that it is overly burdened by regulations and red tape. One interviewee commented light-heartedly that to get a new regulation approved by the Treasury *'you've basically got to offer up three others to compensate'* (Sara Eppel). This New Labour sensitivity to any suggestion that Government policies might harm the competitiveness and productivity of the UK economy has seen the Treasury impose very tough cost-benefit requirements on any new regulatory proposal. So, for example, rather than regulating maximum energy output for standby buttons or banning incandescent light bulbs, the Treasury will recommend encouraging industry to make the changes voluntarily. It is important to note that the Treasury applies this approach to all policy areas - it is not a specifically anti-environment stance – but the importance of regulation to environmental policy means that the impact is relatively greater than in many other policy areas.

Market based instruments (MBIs).

Eco-taxes

As early as July 1997 the Treasury issued a Statement of Intent on Environmental Taxation, which declared that the Government's aim was: 'to reform the tax system to increase incentives to reduce environmental damage. That will shift the burden of tax from 'goods' to 'bads'; encourage innovation in meeting higher environmental standards; and deliver a more dynamic economy and a cleaner environment, to the benefit of everyone.' (HM Treasury 1997). Crucially, the Treasury committed itself to increasing the proportion of revenues gained from taxing environmentally damaging activities.

The Treasury followed the Statement up, albeit rather tardily, with the introduction of the Climate Change Levy in 2001 and the Aggregates Levy (to encourage recycling and re-use rather than extraction) in 2002, but these are the only new environmental taxes to date. it has reformed some taxes, including company car tax and Vehicle Excise Duty to improve their environmental impact. It has not followed the example of innovative taxes elsewhere in the EU, especially in response to the burden on landfill, such as the Irish and Danish taxes on plastic bags, the Danish tax on paper bags, or the Dutch water pollution charges. It has consistently refused calls from the Environmental Audit Committee and

others to follow the example of several countries by establishing a Green Tax Commission to explore the scope for more extensive environmental taxation.

The Treasury has failed to deliver on its 1997 Statement of Intent. As Table 5.1 shows, whilst Government revenue from environmental taxes rose between 1994 and 1999, primarily due to the fuel duty escalator, after its abolition revenue has declined significantly. Indeed, until Budget 2007, both the CCL and Aggregates Levy had been frozen since their introduction, and Air Passenger Duty had been frozen from when it was reformed in 2001 until Pre-Budget 2006.

Table 5.1 UK Environmental Taxes 1994-2005

Tax/£ billion	Intro-duced	1994	1997	1998	1999	2000	2001	2002	2003	2004	2005
Energy											
Duty on hydrocarbon oils	1928	14.0	18.4	21.0	22.4	23.0	22.0	22.1	22.5	23.4	23.3
VAT on duty	1973	2.4	3.2	3.7	3.9	4.0	3.9	3.9	3.9	4.1	4.1
Fossil fuel levy	1990	1.4	0.4	0.2	0.1	0.1	0.1	0.0	-	-	-
Climate change levy	2001	-	-	-	-	-	0.59	0.83	0.83	0.77	0.75
Road vehicles											
Vehicle excise duty	1921	3.8	4.3	4.6	4.9	4.6	4.1	4.3	4.6	4.8	4.8
Other environmental taxes											
Air passenger duty	1994	-	0.44	0.82	0.88	0.94	0.82	0.81	0.78	0.86	0.90
Landfill tax	1996	-	0.38	0.33	0.43	0.46	0.50	0.54	0.60	0.67	0.73
Aggregates levy	2002	-	-	-	-	-	-	0.21	0.34	0.33	0.3
Total environmental taxes*		21.8	27.4	30.7	32.6	33.2	32.0	32.7	33.6	35.0	35.0
as % of total taxes and social contributions		**9.3**	**9.5**	**9.8**	**9.8**	**9.3**	**8.7**	**8.8**	**8.6**	**8.3**	7.7
as % of GDP		**3.2**	**3.4**	**3.6**	**3.6**	**3.5**	**3.2**	**3.1**	**3.0**	**3.0**	**2.9**

Source: UK Environmental Accounts Autumn 2006, Office of National Statistics

The reintroduction of the fuel duty escalator from October 2007, the doubling of APD and increases in VED, plus the regular Landfill Tax escalator increase, should lead to an increase in environmental tax revenues, but the share of overall tax revenue will probably still be lower than the peak in 1998-1999.

Thus the Treasury raised expectations that it would adopt a progressive, pioneering role in the design and implementation of eco-taxes, but whilst there are some important achievements, it has largely failed to deliver the level of tax activism that it promised:

That, for us on the Commission, is another terrible lost opportunity. I think back to the 1998 Statement of Intent on ecological tax reform, which is, in my opinion almost without doubt the best positioned paper on the benefits of ecological tax reform that any Western Government has ever produced. The analysis was fantastic, the aspiration level was very high, the intent was clear, which was to substitute green taxes for other taxes, particularly taxes on Labour, on value added, on profit and so on. (Jonathon Porritt)

It is clear that the Statement of Intent no longer – if it ever did - drives Treasury thinking.

The Treasury sees eco-taxes as 'bad politics'. The Chancellor's first major initiative, the Climate Change Levy, provoked a storm of criticism and two years of business pressure, whilst winning little support in environmental circles. Public discontent about high petrol prices had already seen off the fuel duty escalator, before the fuel protests brought the country to a halt in 2000, and left a permanent scar on the Treasury, which remains extraordinarily wary about raising any eco-taxes, even in line with inflation. Thus the Treasury now seems to believe that the limits of effective eco-taxation have more or less been reached, because it regards taxation as politically unpopular and often regressive, hurting those least able to afford them. Treasury thinking is much more focused on emission trading and other instruments, rather than taxation. It almost certainly now regrets the Statement of Intent because it has established a criterion – eco-taxes as a percentage of GDP - by which it is judged externally, which the Treasury regards as unhelpful.

Yet, the Treasury has itself contributed to the problems with eco-taxation by freezing the rate of most eco-taxes since 2001, which has made it much harder now to introduce increases that will have any significant impact on behaviour. Thus the doubling of APD has for most flights only restored the duty to the level it was at in 2001.

The recent increases in APD, VED and fuel duty in part reflect the changed politics of climate change over the last 12 months, which have obliged Gordon Brown to look more progressive on this issue. More fundamentally, they are also a response to the failure of key climate change policies to hold down carbon emissions, notably the voluntary agreement with car manufacturers which has not delivered predicted vehicle emission cuts, and pending the inclusion of aviation in the ETS which remains several years away. The Treasury clearly recognises that eco-taxes do need to be used, at least in the short-term, but probably indefinitely, to exert greater control over the transport sector.

Tradable Permit Schemes

Treasury thinking is clearly focused on tradable permit schemes as the most effective means of delivering climate change targets. It is widely acknowledged that in this area, the Treasury has been quite innovative. The UK ETS was a pioneering scheme – the world's first emissions trading scheme - notwithstanding its limited effectiveness in reducing emissions. The Treasury has been an active supporter of the EU ETS, promising tougher cuts than many other member states and strongly supporting the inclusion of aviation in the scheme. The Renewables Obligation is also a form of tradable permit scheme, because it has created a market in Renewable Obligation Certificates.

The Treasury's enthusiasm for emissions trading is largely backed up by the Stern report and by many experts, including most of those interviewed for this report.
However, the Treasury should be careful not to adopt an overly narrow range of environmental policy instruments because there are major teething problems with carbon markets generally and, as Box 3.2 demonstrates, with the EU ETS in particular.

The bottom line is that, to date, only limited emissions reductions have been achieved by either the UK ETS or in the first phase of the EU ETS (2005-07) (see, for example, Gibbs and Retallack 2006; CEPS 2007).[22] In the UK, the second phase (2008-12) will achieve some reductions in the UK energy generation sector but will have no impact on the business sector. Aviation will not be part of the EU ETS until 2011 at the earliest. Moreover, by allocating free emission rights rather than auctioning them, both the UK and the EU ETS have provided huge corporate windfall profits for some corporations in what is, in practice, a massive state subsidy.

The Treasury is right to lobby hard within the EU for reform of the ETS – to prevent the oversupply of emission permits by some member states, ensure greater harmonisation in the allocation systems, improve the quality of the emissions data and increase the number qualified experts who can verify emissions data claims. It is correct in its belief that businesses need long-term certainty about the future carbon price so that they have the incentive to invest in emission abatement technologies; indeed, as several interviewees recalled, this was the main thrust of the Treasury's press briefing at the time of the publication of the Stern Report (REF). If these aims can be achieved, we can expect each phase of the scheme to be increasingly effective in reducing emissions. However, significant savings remain some way off. It is hardly surprising, for example, that the aviation industry supports its inclusion in ETS over further tax increases when it knows the former will take years to bite – if at all. Thus in the short to medium term, the EU ETS must be supplemented by an extensive range of additional policy instruments, which should include a set of stringent eco-taxes. The recent increases in tax rates suggest that the Treasury may be aware of this problem.

The Treasury must take credit for commissioning the Stern Report, which has had enormous international and domestic influence. Yet the message that the Treasury seems to have taken from Stern is that international action is essential – without it, we can achieve little. No one would argue with this view. However, as one interviewee put it, *'the Treasury seems to have interpreted it as an excuse for inaction domestically'*. Since the publication of Stern, apart from Gordon Brown's use of more green rhetoric in his speeches and increasing various eco-taxes, neither Pre-Budget nor Budget 2007 has hinted at any major shift in Treasury policy.

[22] But note one academic study that questions the extent of this oversupply (Ellerman and Buchner 2006)

5.5. Policy Implementation

Labour environmental policy on both climate change and biodiversity has suffered from a number of implementation failures, not least the likely failure to achieve the 2010 carbon emissions 20% reduction target.

Indeed, one form of implementation failure has been the consistent weaknesses in Departmental forecasting. The EAC has repeatedly highlighted these problems, particularly with regard to the DTI: *'We have serious concerns about the ability of the Government to model reliably and in a timely fashion future energy and emissions forecasts'* (EAC 2006a: para.28). One DTI forecast underpinning the CCP 2000 predicted that most carbon reductions would occur in the electricity generation sector, yet by 2002 emissions were already deviating significantly from the forecast as more electricity came from coal-fired generators. The EAC castigated the DTI for promising updated detailed energy projections in March 2004 that finally emerged in 2006. The lack of robust forecasts seems to have delayed the Government from acknowledging that CCP 2000 was off course – it may therefore have held back a more positive approach to renewable energy, which might have been forced on the Government if it had realised what was happening to emissions. It certainly hampered the Government's attempts to set its emissions cap for Phase 1 of the EU ETS.

Of course, forecasters have also been let down by the failure to implement key policies. The former Secretary of State for the Environment in the Conservative Government, John Gummer, observed that *'The Government has never been able to work out how what you want to do, you do. It's not joined-up government we lack, it's joined-down. There isn't a connection between the Government, what it says and what it does'*. Whilst Gummer may be partisan (although less so than most in his party), there are plenty of examples of an 'implementation deficit' in Labour climate change and biodiversity strategies:

- Targets for renewable energy have consistently been missed as blockages in the planning process have severely restrained the growth of this sector. Although the Government eventually introduced revisions to the planning laws in 2004 to help renewable energy proposals, these have not always been applied on the ground. The Renewable Obligation has effectively discouraged those options further from the market, such as offshore wind.

- Compliance with Building Regulations for both businesses and household is poor.

- A major focus of the Energy Efficiency Commitment has been on installing cavity wall insulation, yet the scale of the planned installations is far above what can practically be achieved.

- Predicted emissions reductions arising from the Voluntary Agreement with European car manufacturers – the biggest contribution from the transport sector towards the UK Climate Change Programme - have been revised downwards, primarily because the trend towards larger and heavier vehicles was not anticipated.

- The 2010 targets in the UK Biodiversity Action Plan will probably not be met because of a significant shortfall in the funds required to implement the remaining BAPs, particularly the species BAPs, of around £339 million per year.

- The Environment Stewardship Scheme, particularly the Higher Level scheme, has got off to a slow start due to problems in processing applications and a generally uptake by farmers.

These examples are not exhaustive. Whilst every Government experiences failures in policy implementation, efforts to remedy these problems have often been either very tardy (intervention in the planning process in favour of renewable energy) or simply unforthcoming (public expenditure on biodiversity).

One factor contributing to implementation failure, commented upon by several interviewees, has been the extraordinary propensity of the Labour Government to launch new initiatives. The environment has not escaped this phenomenon. One former ministerial advisor recalled that there were '*Lots of consultations. Way above delivery of change. All the civil service energy went into "lets have another consultation". Consultations are important but they are often an excuse for inaction or they just diverted energy to the wrong place. I would've liked fewer strategies and civil servants focused more on delivery of change on the ground'*. It remains to be seen whether this enthusiasm for initiatives will continue to characterise a Brown Administration.

5.6. Lifestyle Change or the Techno-fix?

The analysis of climate change in Chapter 3 indicates that there are several major challenges that the Government has so far failed to address effectively. These include the challenge of moving to a low carbon energy supply and consumption infrastructure, the failure to persuade householders to adopt more energy efficient lifestyles and the virtually unchecked growth of carbon emissions in the transport sector. It is widely recognised that these core problems will require major behavioural changes by UK citizens in almost every aspect of their lives – their homes, how they travel and their leisure activities. It will also require changes to infrastructure and institutions that currently favour powerful business interests. Thus the Government could encourage these changes to take place by, for example:

- Introducing important infrastructural changes to the energy sector, such as changing the electricity settlement system to facilitate microgeneration, or tightening and enforcing building regulations.

- Requiring business to make it easier for individuals to change their behaviour by, for example, introducing tougher regulations on packaging, enforcing energy efficiency requirements for electrical goods, banning the sale of non-energy efficient light bulbs or regulating stand-by buttons.

- Embracing the contemporary concern about climate change by building a better dialogue with the public, educating people in what needs to be done and winning acceptance for a broader fiscal framework of incentives that would help direct the choices of individuals. The Government pays some lip-service to this approach, but it has devoted relatively little time or resources to communicating with the public.

However, these actions will require brave decisions if the Government is to tackle them head on, but for the reasons identified in this chapter these solutions have not yet been forthcoming. Rather than encourage this behavioural revolution, the Labour Government prefers to seek the silver bullet of a techno-fix solution.

Blair's enthusiasm for nuclear power is the obvious example of the techno-fix. His support seems to have reflected a dismissive attitude to the alternatives of small-scale renewable energy and the potential for domestic energy efficiency measures to deliver substantive emissions reductions. It also indicated a reluctance to court unpopularity by interfering with individual lifestyles – telling people what to do in their own homes.

Similarly, transport policy is also replete with techno-fix solutions, such as more fuel efficient cars and aeroplanes. The current flavour of the month (on both sides of the Atlantic) is biofuel, even though it has many potential flaws as a solution (see Box 3.5). Yet little attention is given to implementing one of the core principles of the 1998 Transport White Paper: shifting people out of their cars and onto public transport, bicycles or foot. Again, Blair's comments about his family's right to take regular long haul flights revealed an unwillingness to shape the agenda on this fundamental issue.

5.7. Conclusion

This chapter has identified the critical issues and obstacles that have shaped the Labour Government's environment policy under the broad categories of environmental politics and environmental governance.

The remarkable intensity of environmental politics over the last 12 months compares sharply with the previous nine years of Labour Government. Previously the environment had been a low profile party political issue: it had limited political salience, the opposition parties did not attack the Government on its environmental policies, there was little bottom-up pressure to act from the Parliamentary Labour Party or the wider party in the country. The green lobby was initially too uncritical of Labour and has struggled to generate any groundswell of pressure on the Government to act, particularly in the face of a powerful CBI-dominated business lobby. On numerous legislative and policy proposals, ranging from reform of building regulations to the Marine Bill, and from the Aviation White Paper to the house building programme, the powerful business lobby seems to have had the ear of the Treasury with its deregulation and competitiveness agendas.

The transformation in environmental politics in the last year, at least with respect to climate change, was the result of a combination of events - the publication of a litany of

reports, notably by Stern and the IPCC; important international initiatives by the G8 and the EU; the 'Cameron effect'; the appointment of David Miliband as Secretary of State for the Environment – that have produced a seemingly unquenchable media thirst for climate change stories. These events have helped create a 'window of opportunity' that environmental groups have been able to exploit, as with the Friends of the Earth Climate Change Bill campaign, whilst many parts of the business community have been announcing their conversion to the green cause on almost a daily basis.

There is little doubt that this politicisation of the environment has contributed to the distinct ratcheting up of Government climate change initiatives in the short time since the publication of the disappointing Climate Change Programme in March 2006. Whilst the likely impact of these new measures – which include the Climate Change Bill, several eco-tax increases, more financial support for renewable energy, and a much greater focus on the domestic household sector – should not be overestimated, they demonstrate how increasing the political salience of the environment can create the conditions for policy change.

One caveat is that climate change has become almost synonymous with the environment, which could see other environmental issues downgraded in importance. Certainly, NGOs complain that it is harder to persuade politicians to address biodiversity issues. Of course, tt is possible that these issues could benefit by association, dragged along in the wake of climate change if the Government is keen to demonstrate its green credentials in the face of the Tory assault and the current media interest. Either way, as climate change demonstrates, *politics matters*.

The key message from the discussion of environmental governance is the need for political leadership to drive environment change horizontally across and vertically down through the government machine. Tony Blair provided unprecedented leadership on the international stage but his domestic impact was limited. Under Gordon Brown the Treasury showed fleeting moments of interest in environmental issues, as with the Climate Change Levy, but usually economic and social justice issues dominated his agenda. As a result, the persistence of Departmental silos indicates that joined-up environmental government is little better than a decade ago. Only DEFRA gives consistent priority to climate change and biodiversity. Miliband was able to achieve much in his short spell at DEFRA, but he was unable to transform DfT, DfID or the DTI. If Prime Minister Brown is serious about the environment, then he needs to signal that it is a critical issue for him – and that the Treasury must give it far higher priority.

6. Conclusion

Key Chapter Message

1. If Prime Minister Brown is serious about the environment, then he needs to signal that it is a critical issue for him. His early actions as Prime Minister were disappointing, with no indication that environmental concerns shaped the formation of his first government. Yet if his claim that he is committed to Cabinet Government has substance, then the environment offers the perfect opportunity for Brown and his new Government to demonstrate a new style of collective leadership, in which old style Departmentalism is replaced by a progressive, genuinely joined-up strategic approach to resolving the twin challenges of climate change and biodiversity loss.

If politicians were simply to respond to scientific evidence then we would expect to see a significantly more urgent and radical response to the twin challenges of climate change and biodiversity. The reality is that Governments have many conflicting pressures and our political leaders have almost always chosen to give priority to other issues, or had more urgent demands to respond to than the apparently less immediate problems of global warming or ecosystem collapse.

Yet the formation of the new Labour Government under Gordon Brown opens wider an exciting window of opportunity to make a step change in environment policy. For most of last decade the environment has been a low priority issue. The Government's modest approach to the environment was facilitated by the low political salience of the issue, the lack of effective political opposition, the limited influence of the green lobby and a powerful business lobby that is still mostly blind to the integral role that the environment plays in sustaining economic prosperity.

Yet over the last year there has been an extraordinary transformation in environmental politics. The Stern and IPCC reports have publicised the grave implications of climate change for the economy and human livelihoods. The 'Cameron effect' has forced the environment onto the party political agenda and the appointment of David Miliband as Secretary of State for the Environment provided some genuine domestic leadership on climate change policy. The media has seized on the issue, so the green lobby is starting to be heard again, and there are important signs of change amongst some of the more progressive corporate leaders.

The new intensity of environmental politics has had some concrete results on climate change in the form of Government initiatives such as the Climate Change Bill and a smattering of new measures in the recent Energy and Planning White Papers. As Chancellor, Gordon Brown suddenly seemed particularly keen to boast his green credentials by, for example, announcing increases in several eco-taxes, restoring the fuel duty escalator and promising to build five new eco-towns. These initiatives do not add up to a revolution in policy, and Government targets for reducing greenhouse gases fall well

short of what the scientific evidence suggests is needed. But they do show that the Government – and particularly Gordon Brown – senses a need to respond to climate change. However, biodiversity loss remains a marginal issue despite its equally catastrophic implications.

These recent changes demonstrate that politics matters in terms of securing more effective action on the environment. The challenge now is for all those concerned about the environment to keep environmental politics high on the political agenda and to ensure that the current enthusiasm for environmental issues does not become another short-lived 'issue attention cycle' (Downs 1972). An issue attention cycle refers to the common situation in which an issue emerges (or re-emerges) from the low profile worlds of academic science and political activism, to grab the attention of mainstream politicians, the media and the public. Whilst an issue is in the limelight, public and media pressure forces the government to respond by introducing new policies or setting up new institutions, but then the issue equally rapidly slips off the agenda as the public becomes aware of the costs of action and their attention switches to the pursuit of other issues.

One way of stopping this cyclical pattern would be if all the major political parties – for the first time - made the environment a central issue at the next general election. To do so, both the Labour and Conservative parties would have to embrace the issue more fulsomely than in the past – despite their ideological reservations. Certainly there are political incentives to becoming greener. The female vote will be a key battleground at the next election: women have played a critical role in Labour's three victories and Cameron has clearly identified them as a group whose support he needs to win back to the Conservatives. Polling evidence consistently shows that women are much more concerned about environmental issues than are men. Young voters, amongst whom turnout is very poor, may also be persuaded to vote for a party that presents itself as green. Brown's recent environmental pronouncements indicate that he recognises that he needs to be able to challenge Cameron on this issue. Brown may not have shown any great enthusiasm for the environment as an issue in the past – as Chancellor he took eight years to make his first keynote speech on the subject – but there are many ways in which it links in to the social justice agenda that he cares about so deeply.

There is also a vital role for the green lobby in pushing Government and mobilising public opinion in order to keep the environment high on the political agenda. Similarly, those corporate leaders who have 'seen the light' must spread the word to the many sceptics in their ranks, although the most effective method of persuasion will probably be to demonstrate by their actions that progressive environmental policies bring economic benefits!

Even if these actions occur and the environment retains its higher place on the political agenda, it is almost certain that climate change will not continue to receive the attention it has had in recent months. The public won't keep lapping up horror stories of climatic crisis, and new issues will inevitably draw their gaze. It is therefore crucial to secure concrete achievements now, including making the Climate Change Bill law (ideally with tougher emissions reduction targets), increased public expenditure on key climate change

and biodiversity policies, putting new regulations in place (e.g. domestic energy efficiency measures, tougher building regulations) and introducing new and improved eco-taxes and emissions trading schemes. The objective is to ensure that these policies are in place so that they will continue to have an impact if and when the current enthusiasm about the climate change problem fades.

The analysis of environmental governance demonstrates the urgent need for political leadership. Tony Blair provided unprecedented leadership on the international stage but his domestic impact was limited. Gordon Brown seems to have interpreted the Stern Review as emphasising international *rather* than domestic action, so he is likely to pick up Blair's mantle in international climate change diplomacy, particularly now that he has appointed David Miliband as Foreign Secretary. Yet there is a desperate need for domestic leadership too in order to drive environmental change horizontally across and vertically down through the government machine. Brown must expend some precious political capital in providing this leadership.

If Prime Minister Brown is serious about the environment, then he needs to signal that it is a critical issue for him. His early actions were disappointing. The much rumoured transfer of the energy portfolio from the DTI to DEFRA did not happen. Although restructuring the machinery of government alone solves little, by indicating that he listens more closely to the business lobby than to those environmentalists who believe that a bigger DEFRA would bring greater coordination and political clout to climate change policy, Brown did not demonstrate environmental leadership. By renaming the DTI the Department for Business Enterprise and Regulatory Reform, he underlined his resistance to further environmental regulation. The dynamism of Miliband has been removed from DEFRA, to be replaced by Hilary Benn, whose environmental credentials remain unproved, although he did encourage DfID to give greater consideration to biodiversity issues. By appointing Alistair Darling as Chancellor, Brown has chosen someone who in his tenure at DfT displayed no interest in climate change concerns, yet it is essential that the Treasury gives priority to the environment, particularly in the current Comprehensive Spending Review and the setting of new Public Service Agreement targets that force all key Departments to prioritise environmental problems.

Brown's July statement on the Government's legislative programme included no new environmental initiatives beyond the previously announced plan for a Climate Change Bill and bills on Planning Reform and Energy based on proposals in the June White Papers. Moreover, the increase in house-building plans from 200,000 to 240,000 per year, which were presented as the biggest media story by Brown, will inevitably have implications for biodiversity. In short, the environment seemed to have slipped back down the agenda.

If the Prime Minister is committed to Cabinet Government, then the environment offers the perfect opportunity for Brown and his new Government to demonstrate a new style of collective leadership, in which old style Departmentalism is replaced by a progressive, genuinely joined-up strategic approach to resolving the twin challenges of climate change and biodiversity loss.

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